

THE MODERN CYCLOPEDIA

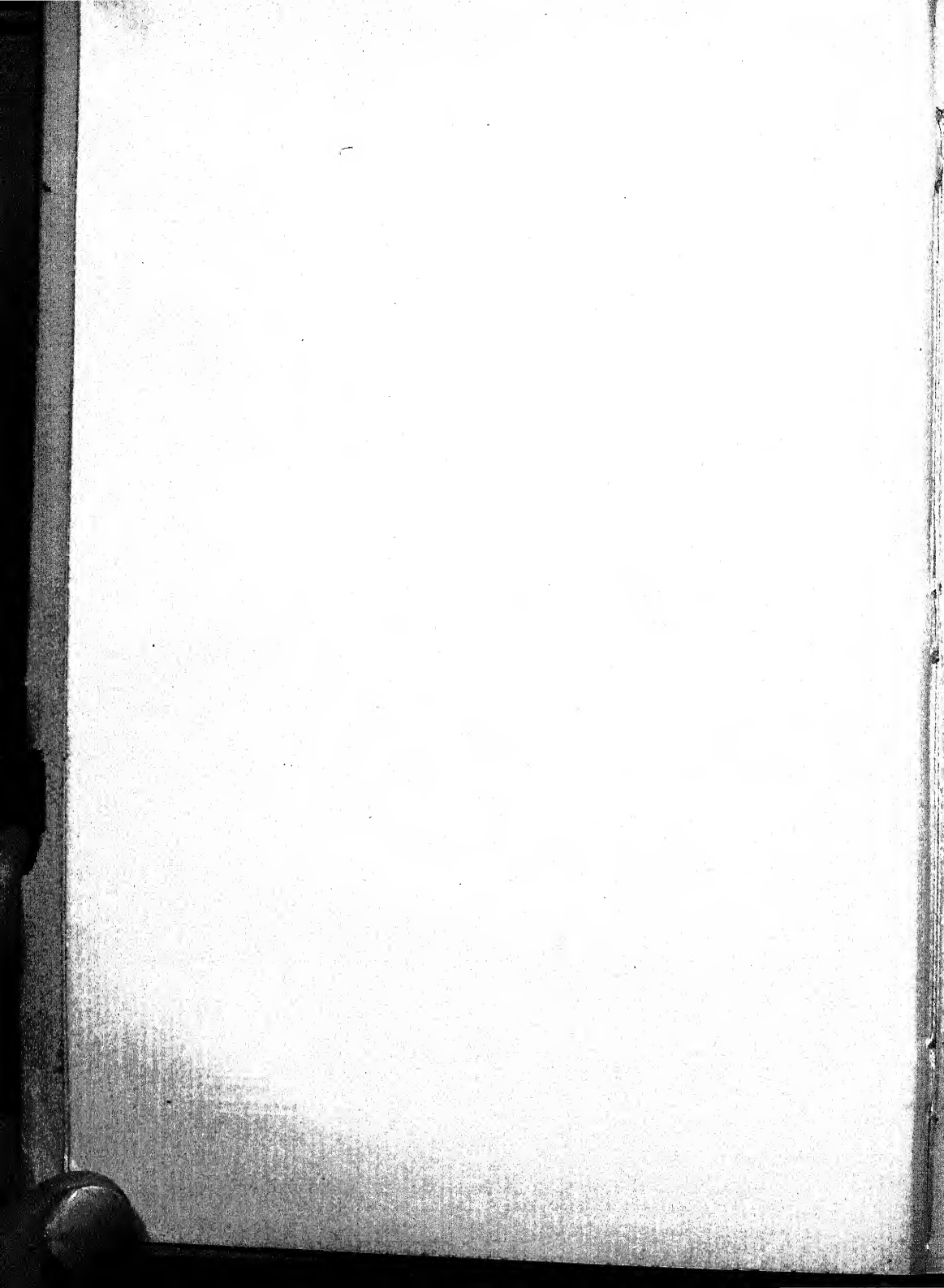
A HANDY BOOK OF REFERENCE ON
ALL SUBJECTS & FOR ALL READERS

A NEW EDITION
REVISED AND EXTENDED

EDITED BY CHARLES ANNANDALE M.A. LL.D.
EDITOR OF "THE IMPERIAL DICTIONARY"
"THE NEW POPULAR ENCYCLOPEDIA" &c.

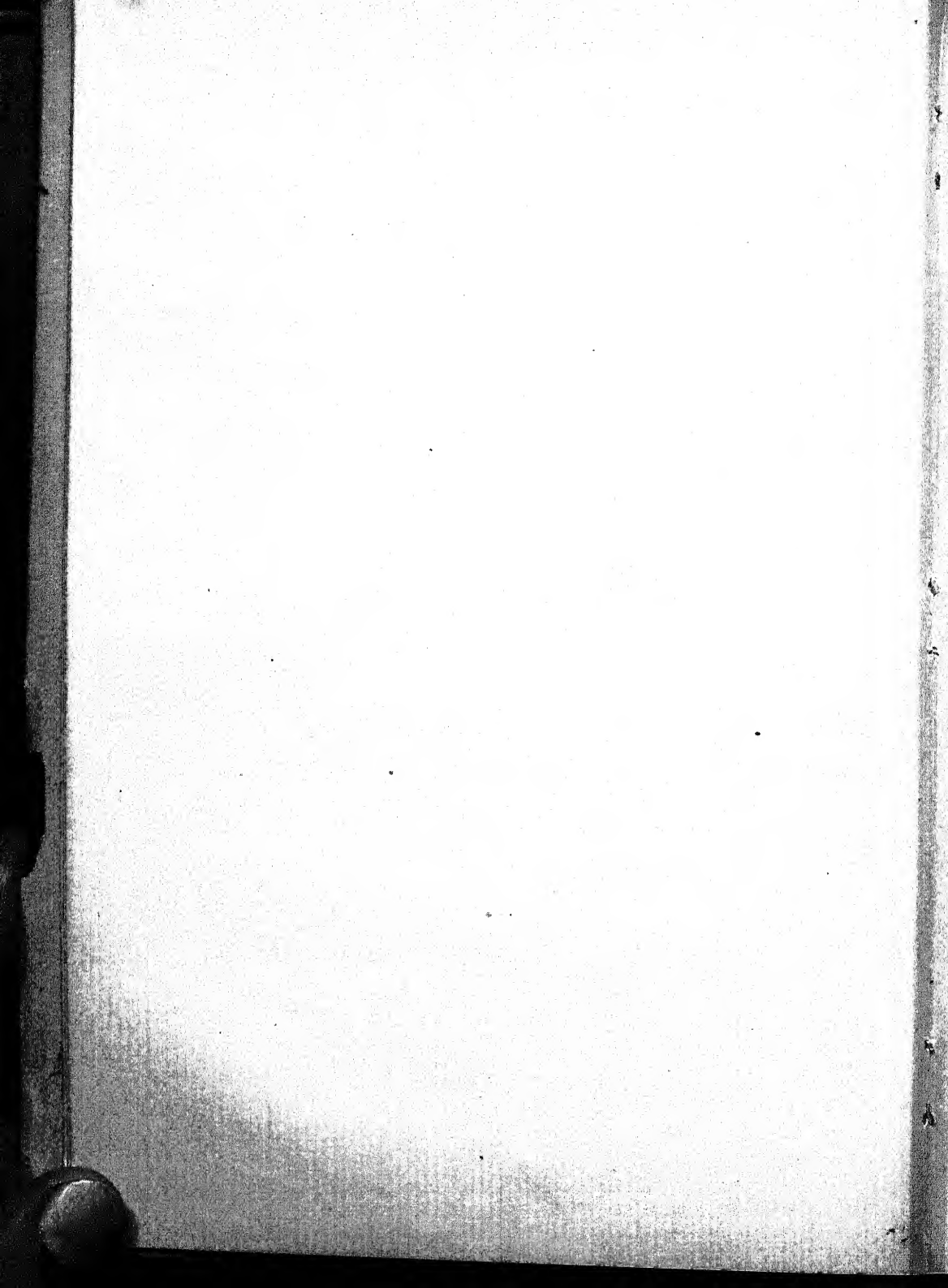
VOLUME VIII

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KEY TO THE PRONUNCIATION.

The pronunciation of the words that form the titles of the articles is indicated in two ways: 1st, By *re-writing* the word in a different form and according to a simple system of transliteration. 2d, By marking the syllable on which the chief *accent* falls. Entries which simply have their accentuation marked are English or foreign words that present little difficulty, and in regard to which readers can hardly go far wrong. A great many of the entries, however, cannot be treated in this way, but must have their pronunciation represented by a uniform series of symbols, so that it shall be unmistakable. In doing this the same letter or combination of letters is made use of to represent the same *sound*, no matter by what letter or letters the sound may be represented in the word whose pronunciation is shown. The key to the pronunciation by this means is greatly simplified, the reader having only to remember one character for each sound. Sounds and letters, it may be remarked, are often very different things. In the English language there are over forty sounds, while in the English alphabet there are only twenty-six letters to represent them. Our alphabet is, therefore, very far from being adequate to the duties required of it, and still more inadequate to represent the various sounds of foreign languages.

The most typical *vowel* sounds (including diphthongs) are as shown in the following list, which gives also the characters that are used in the *Cyclopedia* to show their pronunciation, most of these being distinguished by diacritical marks.

ā, as in <i>fate</i> , or in <i>bare</i> .	eu, a long sound as in Fr. <i>jeûne</i> , = Ger. long
â, as in <i>alms</i> , Fr. <i>âme</i> , Ger. <i>Bahn</i> =ā of Indian names.	ö, as in <i>Söhne</i> , <i>Goethe</i> (Goethe).
ă, the same sound short or medium, as in Fr. <i>bal</i> , Ger. <i>Mann</i> .	eu, corresponding sound short or medium, as in Fr. <i>peu</i> =Ger. <i>ö</i> short.
a, as in <i>fat</i> .	ō, as in <i>note</i> , <i>mean</i> .
â, as in <i>fall</i> .	o, as in <i>not</i> , <i>soft</i> —that is, short or medium.
α, obscure, as in <i>rural</i> , similar to <i>u</i> in <i>but</i> , é in <i>her</i> : common in Indian names.	ö, as in <i>move</i> , <i>two</i> .
ē, as in <i>me</i> =i in <i>machine</i> .	ū, as in <i>tube</i> .
e, as in <i>met</i> .	u, as in <i>tub</i> : similar to ē and also to <i>a</i> .
é, as in <i>her</i> .	ū, as in <i>bull</i> .
i, as in <i>pine</i> , or as <i>ei</i> in Ger. <i>mein</i> .	ü, as in Sc. <i>abune</i> =Fr. <i>â</i> as in <i>dâ</i> , Ger. <i>u</i> long as in <i>grün</i> , <i>Bühne</i> .
i, as in <i>pîn</i> , also used for the short sound corresponding to ē, as in French and Italian words.	û, the corresponding short or medium sound, as in Fr. <i>but</i> , Ger. <i>Müller</i> .
	oi, as in <i>oil</i> .
	ou, as in <i>pound</i> ; or as <i>au</i> in Ger. <i>Haus</i> .

Of the *consonants*, b, d, f, h, j, k, l, m, n, ng, p, sh, t, v, z, always have their common English sounds, when used to transliterate foreign words. The letter c is not used by itself in re-writing for pronunciation, s or k being respectively used instead. The only consonantal symbols, therefore, that require explanation are the following:—

ch is always as in <i>rich</i> .	s, always as in <i>so</i> .
d, nearly as <i>th</i> in <i>this</i> =Sp. <i>d</i> in <i>Madrid</i> , &c.	th, as <i>th</i> in <i>thin</i> .
g is always hard, as in <i>go</i> .	th, as <i>th</i> in <i>this</i> .
h represents the guttural in Scotch <i>loch</i> , Ger. <i>nach</i> , also other similar gutturals.	w always consonantal, as in <i>we</i> .
p, Fr. nasal <i>n</i> as in <i>bon</i> .	x=ks, which are used instead.
r represents both English <i>r</i> , and <i>r</i> in foreign words, which is generally much more strongly trilled.	y always consonantal, as in <i>yea</i> (Fr. <i>ligne</i> would be re-written <i>lëny</i>).
	zh, as <i>s</i> in <i>pleasure</i> =Fr. <i>j</i> .

THE MODERN CYCLOPEDIA.

VOL. VIII.

Skeat (skēt), REV. WALTER WILLIAM, born 1835 in London, educated at King's College School, London, and Christ's College, Cambridge, where he graduated B.A. as fourteenth wrangler in 1858, and became a fellow in 1860. Having taken orders he fulfilled parochial duties for three years, when he was appointed mathematical lecturer at Christ's College (1866-67) and English lecturer (1867-76). In 1878 he was elected to the Elrington and Bosworth professorship of Anglo-Saxon at Cambridge. Skeat is a most successful editor of Early English Literature, and has a profound knowledge of the etymology and history of the English tongue. His chief works include a *Moeso-Gothic Glossary*, the four Gospels in Anglo-Saxon and Northumbrian Versions; editions of *The Vision of William concerning Piers the Plowman*; *Piers the Plowman's Crede*; *The Lay of Havelok the Dane*; *Barbour's Bruce*; &c., for the Early English Text Society. He has edited, for the Clarendon Press, *Piers Plowman*, in two volumes, and the complete works of Chaucer in six. In 1879-82 he published an *Etymological Dictionary of the English Language*, a most able work (3rd edition, 1898), forming the basis of his *Concise Etymological Dictionary* (latest edition, rewritten, 1901). Another important work is his *Principles of English Etymology*. He has also written original poems, translations, &c.

Skeleton, the name applied specially to the hard structures, mostly of bony or osseous nature, which form the internal axis or support of the soft parts in the higher or vertebrate animals. But in comparative anatomy the term *endoskeleton* is applied to the internal hard parts, proper to the Vertebrata, while *exoskeleton* denotes the exterior hard parts both of Vertebrates and Invertebrates, such as the shell of lobster, scales of fishes, &c. The parts of any endo-

skeleton may generally be grouped under the two heads of the spinal or *axial* skeleton, and the *appendicular* parts. The former includes the skeleton of the head and trunk, the latter that of the limbs. The spinal skeleton involves the consideration of the *skull*; *spinal* or *vertebral column*, composed of its various *vertebræ*; and of the *thorax*, or *chest*, and *pelvis*. The limbs consist of homologous or corresponding parts, and are attached to a series of bones constituting the 'arch,' or support of the upper or fore and the lower or hind limbs respectively. The scapulae or shoulder-blades and collar-bones or *clavicles* constitute the shoulder-girdle or arch supporting the fore or upper limb, whilst the lower limb is attached to the pelvic arch or pelvis. See *Skull*, *Spine*, *Thorax*, *Rib*, *Shoulder*, *Arm*, *Hand*, *Pelvis*, *Leg*, *Foot*, &c.

Skelligs, THE, three rocky islets off the south-west coast of Ireland, west of Bolus Head, county Kerry. There is here a light-house, visible 18 miles.

Skelton, a town of England, N. Riding of Yorkshire, district of Cleveland, with extensive iron mines. Pop. 13,239.

Skelton, JOHN, an English poet, born about 1460, probably at Norfolk. He studied at both Oxford and Cambridge, and from the former received the laureateship (then a degree in grammar). He was tutor to the Duke of York, afterwards Henry VIII.; was rector of Diss and curate of Trompington in 1504, and was appointed *orator regius* to Henry VIII. His satirical attacks incurred the resentment of Wolsey, and Skelton had to take refuge in the sanctuary at Westminster, where the abbot afforded him protection until his death, in 1529. His works comprise among others the drama or morality of *Magnificence*; a satire on Wolsey, entitled *Why come ye not to Courte?* the *Tunning* (that is the brewing) of *Elynor*

Rumyang, a humorous picture of low life; and the Book of Phylp Sparrow.

Skene, WILLIAM FORBES, born 1809 at Inverie, Inverness-shire, was educated at the High School, Edinburgh, and studied in Germany and at St. Andrews and Edinburgh Universities. He became a writer to the signet, and while practising as such devoted his leisure to archæological and historical research. His chief works include *The Highlanders of Scotland*, their Origin, History, and Antiquities (two vols., 1837); *The Four Ancient Books of Wales* (two vols., Edin. 1868); and his invaluable *Celtic Scotland*, a History of Ancient Alban (three vols., Edin. 1876-80). He also edited *The Dean of Lismore's Book*, with Introduction and Notes (1861); *Ancient Gaelic Poetry*; *Chronicles of the Picts and Scots*, and other Early Memorials of Scottish History (1867); and *Fordun's Chronicles of the Scottish Nation* (two vols., 1871). He was LL.D. of Edinburgh and D.C.L. of Oxford, and in 1881 was appointed historiographer royal for Scotland. He died in 1892.

Skerries, a seaport and fishing town, Ireland, in the county and 17 miles N.N.E. of Dublin. Pop. 1721.

Skerryvore, a rock in the Inner Hebrides, Scotland, 10 miles S.W. of Tyree island; has a lighthouse 158 feet high, with revolving light visible for 18 miles.

Skew-bridge, a species of bridge which, instead of crossing a road or river at right angles to its course, makes an oblique angle with it, in order that the continuity of the road may be preserved.

Ski'athos, a small island in the Grecian Archipelago, off the south-east coast of Thessaly, north of Eubœa, rising to the height of 1400 feet. Pop. 2790.

Skibbereen, a market-town of Ireland, in the county and 54 miles south-west of Cork, on the river Ilan. The Ilan is navigable for small vessels up to the town. There is a considerable trade in corn and butter. Pop. 3208.

Skiddaw, a mountain mass in the county of Cumberland, England, distinguished for its grand and romantic scenery; height, 3054 feet. It is 3 miles north of Keswick.

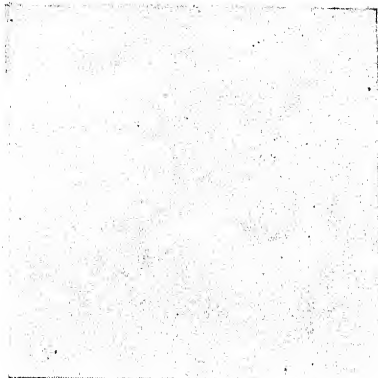
Skien (shên), a port of Southern Norway, 65 miles S.W. of Christiania, on a navigable river of same name. Pop. 11,394.

Skimmer, same as *Scissor-bill* or *Shear-water*.

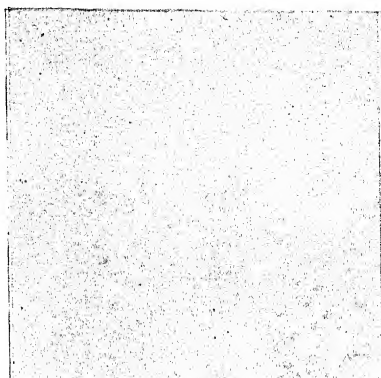
Skin, the name given to the external layer or tissue of the bodies of most animals,

forming at the same time a protective and a blood-purifying organ. Structurally viewed, the skin of all vertebrates consists of two layers—an outer and inner layer. To the outer layer the name of *cuticle*, *epidermis*, or *scarf skin* is popularly given. This layer is destitute of nerves and of blood-vessels, and is thus a non-sensitive structure. The inner layer is, on the contrary, a highly vascular and sensitive layer, and is named the *dermis*, *corium*, or *true skin*. At the lips and elsewhere the epidermis becomes continuous with the more delicate *mucous membrane* which forms the lining membrane of the internal passages. This membrane is to be viewed, however, as a mere modification of the epidermis itself. The epidermis is composed of several layers of epithelial cells. The upper cells of the epidermis, as seen in a vertical section of the skin, are flattened, and of scaly conformation, the lower cells being of rounded or elongated shape. The elongated cells have their long axes arranged vertically to the general skin surface. The deeper portion of the epidermis, or *rete mucosum*, is of softer and more opaque consistence and appearance than the upper layer; and it is in the *rete mucosum* that colouring matters are present, which give the hue to the skin. The *dermis* or true skin rests upon a layer of adipose and cellular tissue, and is composed of interlacing fibres of fibro-cellular tissue. It is richly supplied with blood-vessels, so that when cut it bleeds; and nerve-fibres are likewise disposed in it, conferring sensibility. The surface of the true skin is thrown into a series of elevations, papillæ, or minute prominences, which are specially rich in capillary blood-vessels and nerve endings, and which are thus particularly vascular and sensitive. The special glands of the skin are the sudoriparous or sweat glands; they are in the form of tubes coiled up into balls, and the total number of them in the human skin is estimated at over two millions. There are also sebaceous glands, which secrete an oily fluid useful for lubrication. Though the most ostensible function of the skin seems to be that it covers in and protects the more delicate structures that lie beneath it, its functions as an excretory organ and as a regulator of the temperature of the body are also of high importance. The hair and nails are modifications of the epidermis, as are also the feathers of birds and the claws of animals. Extensions of skin, as between the toes of ducks, &c., or between the arms

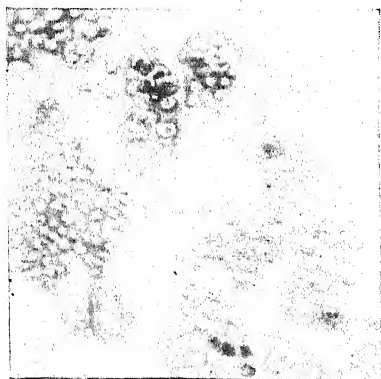
SKIN DISEASES



Nettle Rash



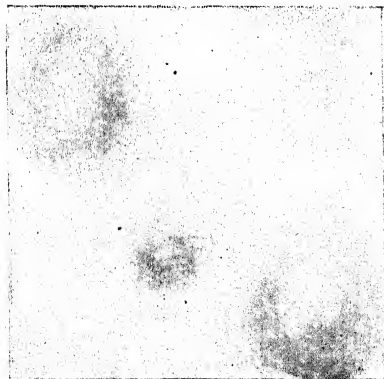
Simple Lichen (Red Gum Rash)



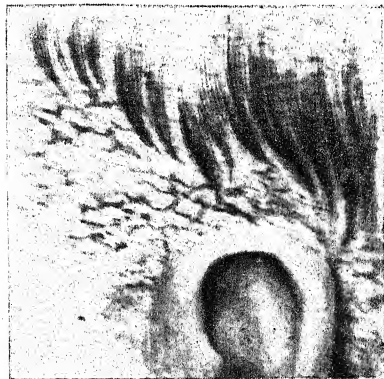
Shingles



Psoriasis (Circular Dry Tetter)



Spotted Rose Rash



Eczema (Running Scab or Moist Tetter)

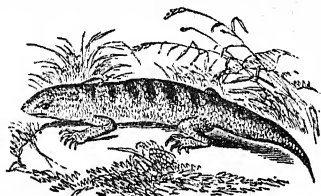


and legs of flying squirrels, and as seen in bats, may exist. And pendulous skin-folds, horns, callosities, horny plates, scales, and other modifications of the epidermis, are met with in various animals. The *scutes* or bony plates seen in the armadillos are dermal structures united to horny plates formed by the epidermis. In many reptiles and in some lizards the two layers of the skin similarly participate in forming the exoskeleton. The scales of fishes are formed by the dermis or true skin; but those of serpents are epidermic in their nature.

Skin Diseases, a name for such diseases as eczema, shingles, ringworm, pityriasis, psoriasis, lichen, itch, &c.

Skin-grafting, in surgery, a method for the treatment of large ulcerated surfaces by the transplantation of small pieces of skin from another part of the body.

Skink, the common name of small lizards belonging to the genus *Scincus*. They have a long body entirely covered with rounded imbricate scales, and are natives of warm



Adda or Common Skink (*Scincus officinalis*).

climates. One species, the adda (*Scincus officinalis*) is celebrated throughout the East as being efficacious in the cure of various cutaneous diseases, to which the inhabitants of Egypt, Arabia, &c., are subject. It is about 6 inches in length, has a cylindrical body and tail, and burrows in the sand.

Skio. See *Scio*.

Skipton, a town in England, county of York (W. Riding), near the Aire, 26 miles north-west of Leeds, giving name to a parl. div. It has manufactures of cottons and woollens, thread, &c., and an ancient castle, a spacious structure, in part erected under Edward II. Pop. (urban dist.), 11,986.

Skirmishers, troops serving in loose order in front of an army. Their usual employment is to protect an advancing army from a surprise.

Skirret (*Sium Sisārum*), a plant belonging to the natural order Umbellifera, sometimes cultivated in kitchen-gardens for its

roots. It is a perennial plant, a native of China and Japan. The roots are composed of several prongs about the thickness of a finger, joined together at the top. The flowers are white, and the roots, which resemble parsnip, may be used from the end of September onwards.

Skittles, a favourite game in England, generally played in covered grounds called skittle-alleys. It is played with a flattish-shaped wooden ball about a foot in diameter, and nine skittles or wooden pins, cigar-shaped and about a foot high. The players try each in turn with how few casts of the ball they can knock down all the skittles. There are, however, minor variations in playing the game.

Skobeleff (MIKHAIL DIMITRIEVICH SKOBELEV), a Russian general, born in 1843, and entered the army as sub-lieutenant in 1861. He distinguished himself against the Poles in 1866, and afterwards in Central Asia. In 1876 he was appointed military governor of the province of Ferghana. In the Russo-Turkish war Skobeleff distinguished himself at the second battle of Plevna, and also at Loftscha. In 1878 he was created adjutant-general to the emperor. In 1880 he successfully led an expedition against the Tekke Turcomans, and captured Geok Tepe, 12th Jan. 1881. He was then promoted to the rank of general. He died suddenly in Moscow in 1882. He was a brilliant and scientific officer, and much beloved by the troops.

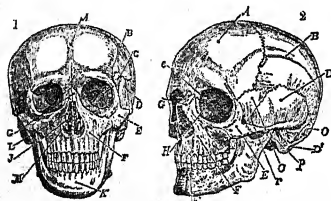
Skop'elos (anc. *Peparēthos*), an island, one of the Northern Sporades, Grecian Archipelago, about 11 miles long and 5 miles broad. The town of Skopelos, on its south-east shore, is a Greek see, and has a number of churches and convents. Pop. 5295.

Skopin, a town of Russia, in the government of Riazan, and 50 miles south of the town of Riazan, on the Verda. Pop. 15,000.

Skua-gull, a powerful bird of the gull family, the *Stercorarius* or *Lestris cataractes*. It is found in the Shetland Islands, the Faroe Islands, and Iceland, and displays much courage in making other birds which prey on fish disgorge their newly-caught food. Smaller species are known in Britain as the Arctic skua and long-tailed skua.

Skull, the name applied to the skeleton of the head, composed in most vertebrates of a *facial* and a *cranial* portion, and which incloses the brain and organs of special sense. The skull of man includes twenty-two bones. In the *cranial* portion there are eight bones, the *occipital* bone o, or hinder

portion of the skull; two *parietal* bones B, forming the sides of the head; two *temporal* bones D D'; the *frontal* bone A; the *sphenoid* bone C, mainly in the base of the skull; and the *ethmoid* bone e, between the skull and the face, and between the eye cavities. The *facial* portion includes fourteen bones—two *nasal* bones G; two *superior maxillary*, or upper jaw-bones F; two *lacrimal* bones H; two *malar* or cheek-bones E; two *palate* bones; two *turbinated* bones L M; the *vomer*, dividing into two the cavity of the nose J, and the *inferior maxillary* or lower jaw-bone K. This is the only bone which is movable, a hinge-joint being formed between its strong prominences at p. The left *zygomatic arch* is shown at r. At the base of the occipital bone is the large aperture termed the *foramen magnum*, through which the brain and spinal marrow become continuous. The two lesser *foramina*, one in either orbit, transmit the optic nerves. The size and shape of the skull vary in the different races of man, and at different ages from infancy to old age. The skulls of most vertebrata differ widely from that of man in the relative development of their



The Human Skull.—1, Front view. 2, Side view.

various parts. See also special articles, such as *Ichthyology*, *Ornithology*, *Reptilia*, &c., and also *Ear*, *Eye*, *Nose*, &c.

Skunk (*Mephitis mephitis* or *putorius*), a carnivorous animal belonging to the weasel family. It inhabits North America, and its average size is about that of a large cat. Its fur is of a dark-brown hue, streaked longitudinally with black and white, and its tail is long and bushy. The skunk is notorious from the potent and disgusting odour which it emits from its anal glands, and which can be perceived a mile away. The secretion of these glands can be forcibly ejected at the will of the animal, and its stench is so persistent that no amount of washing will remove it from clothes impregnated with it. This nauseous secretion has been alleged to possess therapeutical virtues. The skunk is

largely hunted for the sake of its fur, which is purified for commercial purposes by heat.



Common Skunk (*Mephitis mephitis*).

There are two other less common species, now classed in separate genera.

Skunk-cabbage (*Symplocarpus fetidus*), a plant of the natural order Araceae or arums, so named from its smell. The root and seeds are said to be antispasmodic, and have been used as expectorants and as palliatives in asthma.

Skye, the largest of the Hebrides or Western Isles of Scotland, situated on the west of the county of Inverness, of which it forms a part, and from which it is separated by Kyle Rhea and the Sound of Sleat; greatest length, 48 miles; breadth, from 3 to 25 miles; area, about 535 square miles. It is everywhere deeply indented by sea-lochs, and is noted for the grand cliff and mountain scenery around its coasts. The interior may be regarded as one great mountainous moorland, rising in Cuchullin Hills to an altitude of 3200 feet. Numerous streams and fresh-water lochs afford abundance of trout and salmon. The climate is moist and variable. The only arable land lies along the sea-board, and is mostly cultivated under the crofter system. The greater part of the surface is devoted to the rearing of sheep and cattle. The only mineral profitably worked is a crystalline limestone, which furnishes blocks of white and variegated marble. Fishing is the employment of a large number of the population. Portree, a seaport on the east coast of the island, has an excellent harbour. Pop. 13,883.

Skylark. See *Lark*.

Skyros, or **SKYRO**, an island in the Grecian Archipelago, about 25 miles east of the island of Euboea; greatest length, N.N.W. to S.S.E., about 18 miles; breadth, 7 miles. It belongs to the nomarchy of Euboea, and is rocky and not very fertile, but exports corn and fruits. Pop. 4172.

SLAG — SLAVERY.

Slag, a by-product obtained during the smelting of ores in the extraction of the metal. It consists of silicates of calcium and aluminium together with the metal and numerous other substances. As a rule it forms a molten mass in the furnace, is run off and cooled, when it forms a solid with a more or less glassy appearance. Slag is sometimes cast into blocks, and used for road-making and building, and when reduced to powder it is used in making mortar, and in some parts of Europe to impart a glaze to bricks. It is also utilized in the manufacture of glass. *Slag phosphate meal* is a fertilizer made from basic slag obtained in the making of steel (which see).

Slander. See *Libel*.

Slate, or **CLAY-SLATE**, called sometimes *argillite*, a well-known hard variety of rock which splits into thin plates, the type being roofing slate. The lamination of slate is not that of its bedding, but is often at right angles to it. It is produced by lateral pressure, and is confined to disturbed and metamorphosed rock. The prevailing colour is gray, of various shades; it yields to the knife, but varies considerably as respects hardness in its different varieties. Slate occurs in all countries where there are metamorphic rocks. It is commonly divided into elevated beds of various degrees of thickness; and from the natural divisions of the rock, they often form peaked and serrated mountains. The finest variety, which is used for the covering of roofs, is generally embedded in other slate rocks of a coarser kind. Quarries of slate of this description are worked extensively in Carnarvon, Merioneth, Argyll, Lancashire, Cornwall, Perth, and Cumberland; also in various localities in the U. States. Those slates which contain a large proportion of quartz are called *whet-slate*. The most valuable kinds come from Sonnenberg in Meiningen, and Saalfeld. *Chlorite* or *talc slate* are those kinds which contain a large percentage of talc. *Drawing slate*, or *black chalk*, is slate containing 8 to 10 per cent of carbonaceous matter. It comes from Italy, Spain, and Bayreuth. *Polishing slate*, which is composed of the skeletons of infusoria, occurs at Planitz near Zwickau, and near Bilin in Bohemia. It is used for polishing metals. *Slate-pencils* are made of certain varieties of soft slate.

Slater, the popular name of the Oniscidæ or wood-lice family of crustacea, belonging to the order Isopoda. The common wood-

louse or slater (*Oniscus* or *Porcellio scaber*) is commonly found beneath stones, among damp moss, and in similar situations. The colour is a dull leaden hue, which sometimes exhibits white spots. The land slater (*Oniscus asellus*) is another familiar species, and is spotted yellow and white. The water-slators, genus *Asellus*, are found in fresh-water streams and ponds.

Slave Coast, a maritime strip in the west of Africa, on the Guinea Coast, extending between the Volta and the Benin, a stretch of about 240 miles. It is now divided between Britain (Southern Nigeria), France (Dahomey), and Germany (Togoland). A large traffic in slaves was formerly carried on here, hence the name.

Slave Lake, **GREAT**, a large lake of North-western Canada, in the territory of Mackenzie. It is of extremely irregular form, and has an estimated area of 10,000 square miles. It receives the waters of Lake Athabasca by the Slave River on the south, and discharges its own waters by the Mackenzie at its western extremity. The banks of Slave River are in many parts well wooded; numerous rapids and falls occur in its course.—**LESSER SLAVE LAKE** lies about 270 miles south-west of Lake Athabasca, in the province of Alberta. It is about 60 miles long, greatest breadth about 12; it drains to the Athabasca.

Slave River. See *Slave Lake, Great*.

Slavery, the system by which certain persons are kept as the property of others, a system of great antiquity and formerly of wide prevalence. Among the Hebrews the system of slavery was one of great mildness. Native Hebrew slaves were released every seventh year, and their owners were enjoined to treat them kindly. Among the Greeks and Romans slavery was a rooted institution. At Athens the slaves were commonly treated with mildness, but at Sparta they are said to have been treated very harshly. The slaves of the ancient Romans were either captives or debtors that were unable to pay. In Rome the slave had originally no rights at all. He could be put to death for the smallest misdemeanour. Slaves were exceedingly numerous, and latterly almost monopolized all the various handicrafts and occupations, those of the clerk, the doctor, and the literary man included. In the time of Augustus a single person is said to have left at his death over 4000 slaves. Hosts of slaves were employed in the gladiatorial exhibitions. Slave revolts

SLAVERY.

occurred in 134 and 102 B.C. in Sicily, and a revolt in Italy led by the gladiator Spartacus in 73 B.C. was not put down without considerable difficulty. Slaves, however, were often set at liberty, and these freedmen were a well-known class at Rome. But it was not till the time of the empire that any great change took place in the condition of the slaves. Augustus granted the slave a legal status, and Antoninus took away from the masters the power of life and death over their slaves. The early Christian church did nothing to suppress slavery, and slavery and the slave-trade continued to exist for 1000 years in the Christian nations of Europe that rose on the ruins of the Roman Empire. It was not till the 13th century that the severity of slavery began to decline in Europe. The Koran expressly permits the Moslems to acquire slaves by conquest, but this method of acquiring slaves was not resorted to until the Crusades. Previous to the Crusades they kept negro slaves imported from Africa. Latterly the Mohammedans began to obtain white slaves not only by war but also by purchase, Rome being the centre of the trade. The Mohammedans of the Barbary States also obtained white slaves by piracy in the Mediterranean.

After slavery had become all but extinct in Europe, it had a new birth in the American colonies of European origin. The Portuguese were the first to hunt negroes in the interior of Africa for use as slaves in the colonies. The first shipment of negroes to the New World took place in 1503, when the Portuguese landed some in St. Domingo. From that time to the nineteenth century a traffic in negroes across the Atlantic was carried on by all the Christian colonial powers. In 1562 the English first took part in the trade, and in course of time outdid all other nations in the extent to which they carried this traffic, as also, it is said, in the cruelty with which they conducted it. About 1770 nearly 200 English vessels were engaged in the trade.

The first persons who liberated their slaves, and laboured to effect the abolition of the slave-trade, were some Quakers in England and North America early in the 18th century. In 1783 a petition, which Wilberforce eloquently supported, was addressed to parliament for the abolition of the trade. But the soul of all the efforts for the abolition of the traffic was Thomas Clarkson. In 1788 Pitt presented a petition against the

trade to the House of Commons, but the merchants of Liverpool and Bristol resisted its abolition so violently that Pitt, Fox, Wilberforce, and others could effect nothing but the passage of some provisions for diminishing the hardship of confinement on ship-board. A bill passed the House of Commons for the abolition of the slave-trade in 1792, but it was rejected by the Lords. On February 4, 1794, the French National Convention declared all the slaves in the French colonies free. Wilberforce brought in a bill with a like object in 1796, but it was rejected. The African Society, founded by Wilberforce and Clarkson, now redoubled its efforts to procure the suppression of this traffic, and in March, 1807, the famous Abolition Act was passed. January 1, 1808, was fixed as the time when this trade, on the part of the British, should cease. The abolition of the slave-trade by most of the other European powers, as well as those of America, was gradually provided for by treaty. These treaties were mainly enforced by a British squadron maintained off the west coast of Africa. The abolition of slavery itself gradually followed that of the trade in slaves. In 1831 the British government emancipated all the slaves of the crown, and in 1833 a bill was passed for the emancipation of all the slaves in British colonies. By this bill the slaves were to receive their freedom on the 1st August, 1834, and a compensation of £20,000,000 was to be distributed as a gift among the slave-holders, to compensate them for any loss they might sustain by the arrangement. The greatest slave-holding nation till recent times was the United States, in which, however, slavery was only an institution of the Southern States. As a result of the civil war it was abolished by proclamation in 1863, and by constitutional amendment in 1865. In 1873 the Spanish government abolished slavery in Porto Rico, and in 1886 abolition in Cuba took place. In Brazil slavery existed till 1888.

The efforts made to suppress the slave-trade on the east coast of Africa did not till recently prove very successful. In 1817 a treaty for its suppression was concluded with Madagascar, and in 1822 with the Imam of Muscat (Oman); but the slave-trade was, for many years, as active as ever along the whole coast. Those chiefly engaged in the trade were Arabs, who sold the slaves in the African countries bordering on the Mediterranean and at the ports

SLAVES—SLEEP.

of the Red Sea. They were all ultimately destined for Mohammedan masters. The suppression of the trade was one of the objects of Sir Samuel Baker's expedition up the Nile in 1870-73; and much more vigorous and effective measures were carried out by General Gordon in 1877 and subsequent years. In May, 1873, a treaty was signed stipulating for its suppression within the dominions of the Sultan of Zanzibar; and the slave-market at Zanzibar was thereupon closed. At the present time, through the extension of the influence of Britain and other European powers, the traffic has been put down in most districts where it was formerly rampant. The cruelties perpetrated by and under the direction of the slave-raiders have been described by Livingstone and others as quite appalling.

Slaves, SLAVS, or SLAVONIANS, a branch of the Aryan family of nations, among which it is most nearly allied to the Lithuanian and more distantly to the Germanic branch. In the 4th century Slavs lived in great numbers in the neighbourhood of the Carpathians, and thence they appear to have spread northward to the Baltic and southward to the Adriatic. About the beginning of the 6th century they are found on the northern banks of the Lower Danube, whence they passed over to the southern banks, occupying *Moesia* and *Thrace*; at this time Slavs also peopled *Bohemia* and *Moravia*, and before the end of the century they had penetrated into *Transylvania*, *Hungary*, *Upper Austria*, *Styria*, *Carinthia*, and *Carniola*. The Slavonic tribes of *Chorvatians* (Croats) and *Servians* settled probably between 634 and 638 in *Dalmatia* and the whole of ancient *Illyricum* (*Bosnia*, *Servia*, and the neighbouring districts). Finally, Slavonic tribes spread from their first settlements also to the north and east, over the remainder of modern *Russia*. Of this wide territory the Slavonians again lost in process of time the *Elbe* and *Oder* regions, *Upper Austria*, and part of *Carinthia* and *Styria*, of all of which they were deprived by Germanic tribes; large parts of *Transylvania* and *Hungary*, which fell to *Roumanians* and *Magyars*; and parts of the regions on the south of the *Danube*, which came into the hands of *Greeks* and *Turks*.

The Slaves in the districts in which they still exist form two great groups, the south-eastern and the western Slaves. The former include (1) *Bulgarians*, (2) *Servians*, (3) *Croats*, (4) *Slovenians*, (5) *Russians*;

and the latter include (1) *Czechs* (comprehending *Czechs* in the narrower application, *Moravians*, and *Slovaks*); (2) *Sorbs* (*Lusatians*), divided into *Upper* and *Lower Sorbs*; and (3) *Poles*. The total number of Slaves is said to be about 116,000,000, five-eighths of whom are *Russians*. With few exceptions the *Russian* and *Bulgarian* Slaves belong to the *Greek Church*; the western Slaves mostly to the *Roman Catholic*. There are eleven different Slavonic literary dialects. The four principal dialects and literatures are the *Czech* or *Bohemian*, the *Polish*, *Russian*, and *Servian*.

Slavonia (*German, Slavonien*), a region of *Austria-Hungary*, which with *Croatia* and the *Military Frontiers* forms a province or administrative division of the empire; area of Slavonia, 3720 square miles. A branch of the *Carnian Alps* traverses it, and forms the watershed between the *Drave* and the *Save*, tributaries of the *Danube*. Along the rivers extend fertile plains, where large crops of wheat and maize are raised, and immense herds of cattle and swine are reared. Grain, fruit (peaches, chestnuts, almonds, figs), flax, hemp, tobacco, and wine are extensively grown. There are no manufactures deserving of the name. The inhabitants are mostly of the same race with the *Servians*. They belong chiefly to the *Non-united Greek Church*; the remainder are mostly *Roman Catholics*. The language spoken by them is the *Servian*. See *Croatia*.

Sleaford, a town of *England*, county of *Lincoln*, 17 miles south-east of the town of *Lincoln*, with a fine church of the 13th century. It gives name to a parl. div. Pop. 5468.

Sledge, a vehicle moved on runners or on low wheels, or without wheels, for the conveyance of loads over frozen snow or ice, or over the bare ground; called also a *sled*. Also a kind of travelling carriage mounted on runners, otherwise called a *sleigh*: much used in *Russia*, *Canada*, and other northern countries during winter, instead of wheel-carriages.

Sleep, the state in which the activity of the senses and cerebrum or brain proper appears to be naturally and temporarily suspended. This state is consistent with a kind of passive activity of these nervous centres, as seen in the acts or phenomena of dreaming, as well as in other concomitant phenomena of sleep. All parts of the body which are the seat of active change require periods of rest. In the case of the brain it

would be impossible that there should be short periods of activity and repose, that is, of consciousness and unconsciousness, hence the necessity of sleep, a condition which is an unusually perfect example of what occurs at varying intervals in every actively working portion of our bodies. Sleep, therefore, affords the interval during which nervous energy expended during the waking hours is renewed. The respective influences of habit, age, temperament, and occupation have much to do with the induction and maintenance of sleep in different individuals. An abnormal condition of irritability caused by great mental effort or strain for a considerable time, frequently results in preventing the access of sleep when it is desired. This indicates a revolt of the nervous centres, which may prove dangerous if the cause of it be not speedily done away with. Sleep often occurs in very different degrees in different parts of the nervous system. The phenomena of *dreams* and *somnambulism* are examples of differing degrees of sleep in different parts of the cerebro-spinal nervous system. Physiologists are all agreed that the dreamless sleep is the most refreshing, the lighter sleeper being liable to be disturbed by the most trifling noises. In some cases of diseased conditions sleep may be prolonged for indefinite periods, although obviously the distinction between coma and sleep is only made with great difficulty in such cases; whilst, on the contrary, periods of active wakefulness may occur and extend for days, weeks, or even months, without a single interval of sleep or repose. Insensibility is equally produced by a deficient and an excessive quantity of blood within the cranium; but it was once supposed that the latter offered the truest analogy to the normal condition of the brain in sleep, and, in the absence of any proof to the contrary, the brain was said to be during sleep *congested*. Direct experimental inquiry has led, however, to the opposite conclusion. The condition of the brain during sleep is one of considerable bloodlessness. There seems to be both a diminished quantity of blood circulation through the brain, and the speed of its movement is much lessened. See *Dreams, Somnambulism*.

Slesvig. See *Schleswig-Holstein*.

Slibovitz, a kind of spirit distilled in Austria-Hungary from the fermented juice of plums.

Slide-rest, an appendage to the turning-lathe for holding and resting the cutting-

tool, and ensuring accuracy in its motion. The slide-rest imparts motion to the cutting-tool in two directions, the one being parallel and the other at right angles to the axis of the lathe.

Slide-valve, a contrivance extensively employed in regulating the admission or escape of steam or water in machinery. A familiar example of the slide-valve is found in the ordinary steam-valve of a steam-engine.

Sliding-rule, a mathematical instrument or scale, consisting of two parts, one of which slides along the other, and each having certain sets of numbers engraved on it, so arranged that when a given number on the one scale is brought to coincide with a given number on the other, the product or some other function of the two numbers is obtained by inspection. The numbers may be adapted to answer various purposes, but the instrument is chiefly used in gauging and for the measuring of timber.

Slieven, or **SLIVNO**, a town of Bulgaria, at the foot of the Balkans, with manufactures of cloth, otto of roses, &c. Pop. 24,542.

Sligo, a seaport town of Ireland, prov. Connaught, capital of county Sligo, 134 miles N.W. of Dublin, near the mouth of the Garavogue (which drains Lough Gill) in Sligo Bay. It is the most important seaport in the N.W. of Ireland, and has a large trade, chiefly with Liverpool, Glasgow, London, and a few foreign ports. The exports consist chiefly of provisions, cattle, grain, flour, &c.; and the imports, colonial produce, timber, and coals. Sligo was disfranchised in 1870. Pop. 10,870. — The county is bounded N. by the Atlantic, E. by Leitrim, S. by Roscommon and Mayo, and W. by Mayo; area, 461,796 acres, of which about 320,000 acres are cultivated. The coast, along which are Killala and Sligo Bays, is low and sandy. The greater portion of the county gradually rises from the coast to the ridges of the Ox Mountains, whence it descends into the valleys of the Moy and other streams. The principal rivers are the Arrow, Owinmore, Esky, and Moy. There are also several lakes, having an aggregate area of 12,740 acres, and including the beautiful Lough Gill, Lough Arrow, and Lough Gara. The principal crops are oats and potatoes. Coarse woollens and linens are manufactured for home use. The coast fisheries are extensive. The county returns two members to parliament. Sligo is the only town of any size. Pop. 84,083.

Sling, an instrument for throwing stones or bullets, consisting of a strap and two strings attached to it. The stone or bullet is lodged in the strap, and the ends of the strings being held in the hand the sling is whirled rapidly round in a circle, and the missile thrown by letting go one of the strings. The velocity with which the projectile is discharged is the same as that with which it is whirled round in a circle, having the string for its radius. The sling was a very general instrument of war among the ancients. With a sling and a stone David killed Goliath. The name is also given to a kind of hanging bandage in which a wounded limb is sustained; and to a device for holding heavy articles, as casks, bales, &c., securely while being raised or lowered.

Slip, an inclined plane upon which a vessel is supported while building, or upon which she is hauled up for repair; also, a contrivance for hauling vessels out of the water for repairs, &c. One form of slip consists of a carriage or cradle with truck-wheels which run upon rails on an inclined plane. The ship is placed on the carriage while in the water, and the carriage together with the ship is drawn up the inclined plane by means of wheels and pinions wrought by men or steam power.

Slips, PROPAGATION BY, a mode of propagating plants, which consists in separating a young branch from the parent stock, and planting it in the ground. Slips from trees of which the wood is white and light, such as willow, poplar, or lime, succeed best. A slip succeeds more certainly when two or three young buds are left on the lower part of it under ground.

Sliven, SLIVNO. See *Slieven*.

Sloane, SIR HANS, a distinguished naturalist, and founder of the British Museum, was born in the north of Ireland in 1660, studied medicine in London, Paris, and Montpellier, and died at Chelsea 1753. In 1684 he settled in London in the practice of his profession, and in 1685 was admitted a fellow of the Royal Society, of which he was appointed secretary in 1693, and president in 1727. His *Natural History of Jamaica* (1707-25) was the result of his observations in that island during a visit in 1687-89. George I. created him a baronet and physician-general to the forces in 1716, and on the accession of George II. he was named physician in ordinary to his majesty. See *British Museum*.

Slobodskoi, a town of Russia, government of Viatka, on the right bank of the river Viatka. Pop. 10,000.

Sloe, or BLACKTHORN (*Prunus spinosa*), a well-known deciduous shrub of the plum genus with spinose branches, and possessing a very hard, tough wood. It blossoms with white flowers in the early spring, and has a black, round, austere fruit which is used for preserves, for making a fictitious port wine, and for dyeing black. The sloe abounds in Britain and most



Flower and Fruit of Sloe
(*Prunus spinosa*).

parts of Europe, and is from 8 to 15 feet high. There are two or three varieties, including double-flowered, variegated-leaved, and egg-shaped fruited forms.

Slonim, a town in the government of Grodno, Russia, and 70 miles south-east of the town of Grodno. Pop. 16,000.

Sloop, a small vessel furnished with one mast and a fixed bowsprit. It is fore-and-aft rigged, and usually carries a main-sail, fore-sail (jib-shaped), a jib, and a gaff-sail. The sloop much resembles the cutter, but the latter's bowsprit is not fixed. See *Cutter*. A *sloop-of-war*, in the British navy, was formerly a vessel, of whatever rig, between a corvette and a gunboat, carrying from ten to eighteen guns.

Sloth, the name applied to several genera of edentate mammalia inhabiting South and Central America and forming the family Bradypodidae. This family is distinguished by the flat short head, and by the elongated legs, furnished with powerful claws of compressed and curved shape. No incisor-teeth exist, but simple molars are developed. The stomach is of somewhat complex nature. The fore-limbs are longer than the hind-limbs, and have a powerful muscular organization. The palms and soles of the feet are turned inwards, and the claws are bent inwards towards the soles, so that the shoth's movements on the ground are both awkward and painful; but in their natural habitat amid the trees, the curved and inwards-disposed claws and limbs are seen to be admirably adapted for locomotion in their characteristic fashion, back downwards, through their native forests. Of the

SLOTH BEAR—SMALL-POX.

sloths the best-known species is the ai (*Bradypus tridactylus*), which has three toes and is of a brownish-gray colour, with darker tints on the face and limbs. The fur is of very coarse character. The unau, or two-toed sloth (*Cholepus didactylus*), has an average length of about 2 feet, and its colour is a lighter gray than that of the ai. The tail in both species is either wanting, or at the most is of rudimentary character.

Sloth Bear. See *Answail*.

Slough (slou), a town of England, in Buckinghamshire, 20 miles west of London and 2 miles N.N.E. of Windsor. At Slough Sir William Herschel erected his large astronomical telescope, and made some of his most important discoveries. Pop. 11,461.

Slovaks', the name of the Slavonian inhabitants of Northern Hungary, also found in Moravia in the districts adjoining Hungary, and in detached settlements in Lower Austria, Bukowina, and Slavonia. The Slovaks possess in their own dialect a number of beautiful popular songs, collections of which have been published at different times. The total number of Slovaks is under 2,000,000.

Slovene'ians, the native name of some Slavonian tribes in Styria, Carinthia, Carniola, and Hungary, numbering about 1½ million. The language of the Slovenians is closely allied to the Servian. It possesses some very old and valuable monuments of the Slavonic tongue.

Slow-match, a match made so as to burn very slowly. The commonest kind of slow-match is a piece of slightly twisted hemp rope dipped in a solution of saltpetre, sugar of lead, &c. Slow-matches are chiefly used to fire mines or blasts, the object of using them being to allow the person who fires them to escape to a safe distance before the explosion takes place.

Slow-worm. See *Blind-worm*.

Sloyd, **Slöjd** (a Scandinavian word equivalent to the English *sleight*), a system of manual training for pupils in elementary and higher schools, much in vogue on the Continent and practised in some English educational establishments, in which the pupils are accustomed to the use of tools in a handicraft, which is not necessarily intended to form their future exclusive or main occupation. It is applied to any useful handicraft such as carpentry, metal-work, basket-work, fretwork, bookbinding, &c., but is usually confined to wood-sloyd, or the use of the knife and carpenter's tools.

There is a training school for Sloyd near Gothenburg, which is attended by teachers from all countries. It is already practically introduced into America under the name of manual training.

Slug, the name applied to several genera of gasteropodous molluscs, included in the pulmoniferous (or 'lung-bearing') section of the class, and resembling the snails, but mostly without an external shell. The typical slugs form the family Limacidae, and possess a rudimentary shell, internal in its nature, and generally concealed more or less completely by the mantle. The body is elongated, depressed, and attenuated backward, the head and tentacles retractile. The latter are four in number, the eyes being borne on the tips of the larger pair. Of the type-genus *Limax* there are several British species, including the great gray slug (*L. maximus*) and the milky slug (*L. agrestis*). The former, sometimes over six inches long, is the largest British slug. Both are fond of dark, moist places and are mostly vegetable-feeders. Other genera are *Arion*, including the common black slug (*A. empiricorum*), which is sometimes found red and of other colours, and *Testacella*, represented by the little carnivorous *Testacella haliotidea*, which feeds chiefly upon earth-worms, and is generally found in the loose soil of gardens.

Slur, in music, a sign in the form of a curve, placed over two or more notes on different degrees, to indicate that they are to be played *legato*.

Smack, a small vessel rigged as a cutter, sloop, or yawl, used in the coasting trade and in fishing.

Smalkaldic League. See *Schmalkalden (League of)*.

Small-arms, a general name for all portable fire-arms. (See *Musket, Rifle, Revolver*, &c.) The name of *small-arms factories* is given to certain government establishments for the manufacture of small-arms. The only factory of this sort now is that at Enfield, in Middlesex, that near Birmingham having been closed in 1906. The different parts of the rifles are made so accurately on the same model that a part belonging to any one of the rifles manufactured there will do equally well for any other. The name of the factory has been applied to several types of rifles, including the present Lee-Enfield.

Small-pox, an infectious disease, characterized by a pustular eruption accompanied

by high fever. The first symptoms of the disease appear about seven days after infection, when a feverish shivering pervades the body, followed about three days later by the appearance of red spots on the face, breast, hands, and gradually over the whole body. After about three days these spots develop pustules, which become inflamed and suppurate. About the eleventh day the pustules begin to dry up and form a crust. Commonly the small-pox virus infects but once, and then only those persons who have a certain susceptibility for it. This disease is first mentioned by Arabic writers. It is not certain how it was introduced into Europe, but from the 13th century downwards it raged with great destructiveness among the Western nations, until it was checked by the introduction of vaccination. It is more fatal on its first appearance in a country, and commits greater ravages, than after having prevailed for some time, as it did in Iceland in 1707, and in Greenland in 1733. The violence of the disorder is lessened when it is produced artificially by inoculation with the small-pox virus. Inoculation was introduced into Western Europe from Turkey by the celebrated Lady Montagu; but it has been entirely superseded by vaccination, which is safer. See *Vaccination*.

Smalt, a combination of common glass with the protoxide of cobalt which imparts a deep blue tinge to the glass. When reduced to an impalpable powder it is employed in painting and printing upon earthenware, and to give a blue tint to writing-paper, linen, &c. It was discovered by a Bohemian glass-blower in the 16th century.

Smart, CHRISTOPHER, English poet, born in 1722, and educated at Pembroke College, Cambridge, where he obtained a fellowship in 1745. He devoted himself to literary work, and, having settled in London, he became intimate with Pope, Johnson, and Garrick. He was improvident and of a convivial disposition. He died within the rules of the King's Bench prison for debtors in 1771. His most remarkable production was the Song to David (1763), written on the walls of a lunatic asylum, where he was temporarily confined. He translated into Latin Pope's Ode on St. Cecilia's Day and Essay on Criticism, the Works of Horace into English prose and verse (1765 and 1767), and published the Parables of Christ done into verse (1765).

Smart, SIR GEORGE, musician, son of a

music-seller in London, born in 1776, died 1867. By industry and careful study he rose to be composer and organist to the Chapel-Royal, St. James's, and directed the music at the coronations of William IV. and Queen Victoria. He was knighted in 1811. He conducted the principal musical festivals, and was the first to introduce Mendelssohn's oratorio St. Paul and Rossini's Stabat Mater. Among his pupils were Madame Sontag and Jenny Lind.

Smeaton, JOHN, civil engineer, son of an attorney, was born in 1724 at Austhorpe, near Leeds. He at first followed his father's profession, but abandoned it for engineering. In 1751 he invented a machine for measuring a ship's way at sea, and also a new form of compass. In 1753 he was elected a fellow of the Royal Society, and was awarded the Copley medal in 1759. In 1755 he was intrusted with the rebuilding of the Eddystone lighthouse, which was completed in October 1759. It stood till 1882, when it was replaced by a new structure. Smeaton was subsequently employed on many works of great public utility, including the Forth and Clyde Canal and Ramsgate harbour. He also perfected Newcomen's engine. (See *Steam-engine*.) He died in 1792.

Smedley, FRANCIS EDWARD, novelist, son of Francis Smedley, high-bailiff of Westminster, born at Marlow 1818, died at London 1864. He was a hopeless cripple from his infancy, and was unable to take active exercise of any kind. He was the author of Frank Fairleigh (1850), Lewis Arundel (1852), Harry Coverdale's Courtship (1854), &c.

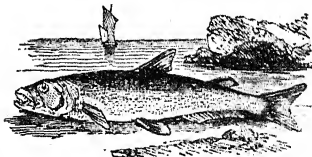
Smell, the sense exercised in the perception of odours, through the functions of the olfactory nerves. The sense is one of the special senses in that the nerves devoted to the appreciation of odours exercise that function alone, and are not affected by any other kind of impressions; whilst again, no nerves are capable of receiving the particular impressions of odours but the olfactory filaments. The sense of smell is derived exclusively through those parts of the nasal cavities in which the olfactory nerves are distributed. (See *Nose*.) The matters of odour must in all cases be dissolved in the mucus of the mucous membrane before they can be immediately applied to or affect the olfactory nerves; thus for the perception of odours the mucous membrane of the nasal cavity must be moist. In animals living in

the air it is also requisite that the odorous matter should be transmitted in a current through the nostrils. This is effected by an inspiratory movement, the mouth being closed. The *voluntary* nature of the act of smelling is also thus exemplified, since by interrupting the respiration or breathing, the sense cannot be duly exercised. The delicacy of the sense of smell is most remarkable; it can discern the presence of bodies so minute as to be undiscoverable even by spectrum analysis; $\frac{5}{100,000,000}$ of a grain of musk can be distinctly smelt. The olfactory nerves form the *first pair* of cranial nerves, or those given off directly from the brain as a centre. The facility with which different odours are perceived varies in different animals. Thus carnivorous mammalia are most susceptible to the odours of other animals than herbivorous forms; and the latter in their turn are more readily affected by the smell of plants. Although the sense of smell in man is less acute than that of many animals, yet his sphere of susceptibility to various odours is more uniform and extended. The influence of *habit* is very marked in the exercise of this sense, custom enabling the individual to inhale odours which at first might be distasteful or nauseous to him. Certain diseases of the brain may produce anomalous effects on the olfactory sense.

Smellie, WILLIAM, naturalist and general writer, born at Edinburgh about 1740, died there in 1795. In 1765 he commenced business as a printer on his own account, and compiled and conducted the first editions of the *Encyclopædia Britannica*, which began to be published in numbers at Edinburgh in 1771, and was completed in three vols. quarto. In 1780 he gave to the world the first part of his *Translation of Buffon's Natural History*. He wrote a number of treatises on various subjects relating to natural history, which in a collected and emended form were published under the title of the *Philosophy of Natural History*; also memoirs of Lord Kames, Dr. John Gregory, and David Hume.

Smelt, a small but delicious European fish, the *Osmérus eperlanus*, allied to the salmon, inhabiting the salt water about the mouths of rivers. It is of a silvery-white colour, the head and body being semi-transparent, and is from 4 to 8 inches long. It inhabits fresh water from August to May, and after spawning returns to the sea. When first taken out of the water smelts have a

strong smell of cucumber. It is called also the *sperling*, or *sparling*. The American smelt is the *Osmérus viridescens*, which inhabits the coasts of New England; but the name is given in America also to other



Smelt (*Osmérus eperlanus*).

fishes. The name of *sand smelt* is given to the *Atherina presbyter*, a small fish allied to the mullets and climbing perches. It averages about 6 inches in length, and is of a pale pink colour, with black spots on the head and back. This fish is most plentiful on the southern coasts of Britain, and is sought after chiefly for bait, but also as a food-fish. The flesh is very delicate.

Smelting, the process by which a metal is obtained from its ore in a melted state by applying great heat. Iron is smelted in lofty furnaces known as *blast-furnaces*.

Smethwick (smeth'ik), a manufacturing town of England, in Staffordshire, $3\frac{1}{2}$ miles N.W. of Birmingham. It has extensive glass-works, chemical works, engineering and machine works, foundries, rivet and tube works, safe-works, &c. Pop. (mun. bor.), 54,539.

Smew (*Mergellus albellus*), a swimming bird, found in winter on the coasts and in the ponds and lakes of Britain. The smew is of shy habits. It flies well, but has an awkward gait on land. Its average length is from 15 to 18 inches. The head, chin, neck, and under parts of the male are white; the back is black, the wings black and white; the back of the head bears a crest of elongated feathers. The plumage of the female is reddish brown mixed with gray tints. The smew is also called the *white-mun*. It is not known to breed in Britain.

Smilacææ, a tribe of plants belonging to the natural order Liliacææ, sometimes regarded as a separate order. They are mostly climbing plants, with woody stems and small unisexual flowers. They are found in small quantities in most parts of the world except in Africa. The genus *Smilax* embraces the various species of sarsaparilla. The tubers of *Smilax China* and of *Rosburghia vividiflora* are used for food.

SMILES — SMITH.

Smiles, SAMUEL, LL.D., was born at Haddington, Scotland, in 1812, and educated for the medical profession. He practised for some years as a surgeon at Leeds, when he became editor of the Leeds Times. In 1845 he became secretary to the Leeds and Thirsk Railway, and in 1854 to the South-Eastern Railway, from which he retired in 1866. He died in 1904. His works chiefly deal with industrial enterprise, and include: *Life of George Stephenson* (1857); *Self-Help* (1860); *Lives of the Engineers* (four vols., 1862; new ed., five vols., 1875); *Industrial Biography* (1863); *Lives of Boulton and Watt* (1865); *The Huguenots, their Settlements, Churches, and Industries in England and Ireland* (1867); *Character* (1871); *The Huguenots in France after the Revocation of the Edict of Nantes* (1874); *Thrift* (1875); *Lives of Thomas Edward* (1876), *Robert Dick* (1878), and *George Moore, Merchant and Philanthropist* (1878); *Self-Effort* (1889); *Lives of Jasnin* (1891) and *Wedgwood* (1894). His works are of good moral tendency, are written in a clear and simple style, and many of them have been translated into various European languages. The University of Edinburgh conferred the degree of LL.D. on Smiles in 1878.

Smirke, ROBERT, an English painter, born in 1752, died in 1845. He was elected a member of the Royal Academy in 1793. His pictures are generally of small size, and a large proportion of them are illustrations for books, the Scriptures, Shakspeare, English history, *Don Quixote*, &c., furnishing subjects. — His sons, **SIR ROBERT SMIRKE** (1781–1867), and **SYDNEY SMIRKE** (1798–1877), had considerable reputations as architects.

Smith, ADAM, a distinguished writer on political economy and on morals, was the only son of Adam Smith, controller of the customs at Kirkcaldy, where he was born June 5, 1723, a few months after the death of his father. After leaving Kirkcaldy school he proceeded in 1737 to the University of Edinburgh, and to Balliol College, Oxford, in 1740. In 1748 he took up his abode in Edinburgh, and in 1751 he was appointed professor of logic at Glasgow, and in the next year of moral philosophy at the same university. His first publication, *The Theory of Moral Sentiments*, appeared in 1759, and was most favourably received. His theory makes sympathy the foundation of all our moral sentiments. To this work

he afterwards added an *Essay on the Origin of Languages*. In 1764 he attended the Duke of Buccleuch on his travels, and during a long stay in France became acquainted with Turgot, Necker, D'Alembert, and others. On his return to Scotland in 1766 he retired with his mother to Kirkcaldy, where, after ten years of close study,



Adam Smith.

he wrote his celebrated *Inquiry into the Nature and Causes of the Wealth of Nations* (two vols. 4to, 1776). This work may be deemed the formal precursor of the modern science of economics. (See *Political Economy*.) About two years later he obtained the lucrative post of commissioner of customs in Scotland. In 1787 he was chosen rector of Glasgow University. He died in July 1790. Adam Smith was a man of much simplicity of character, and of a kind and benignant disposition. Numerous editions both of the *Moral Sentiments* and the *Wealth of Nations* have been published. Of the former the sixth edition, published in the year of the author's death, contained considerable additions and corrections. This work was translated into French by the Marquise de Condorcet. A volume of additions and corrections to the first two editions of the *Wealth of Nations* appeared in 1784, and was included in the third edition, published in the same year. The best edition of this work is that with a life of the author, an introductory discourse, notes, and supplementary dissertations by John Ramsay Macculloch (four vols. 1828, often reprinted). The *Wealth of Nations* has been translated into most European languages.

Smith, ALBERT, English writer, born at Chertsey, 1816, and educated at Merchant

Taylor's School. After studying and devoting himself to the practice of medicine for some time, he turned his attention to literature, and produced a number of humorous works, such as *The Adventures of Mr. Ledbury*; *The Scattergood Family*; *Christopher Tadpole*; *The Pottleton Legacy*; &c. But his greatest success was achieved in his entertainments, his panorama of Mont Blanc being an especial favourite. He died in 1860.

Smith, ALEXANDER, poet and essayist, was born at Kilmarnock 1830, died at Wardie, near Edinburgh, 1867. His father was a pattern-designer, and the son adopted the same occupation, and removed to Glasgow for employment and intellectual improvement. Before he had reached his twentieth year he had written, and in 1851-52 he published, his *Life Drama*, a work which attracted (deservedly) a good deal of attention. In 1854 he was appointed secretary of the University of Edinburgh, and the following year produced, in conjunction with Sydney Dobell, a volume of *Sonnets on the War*. This was followed in 1857 by his *City Poems*, to which succeeded his longest and best poetical work, *Edwin of Deira* (1861). He subsequently became an active contributor to magazine literature. In 1863 he published a collection of papers entitled *Dreamthorp*, which was succeeded by *A Summer in Skye* (1865) and *Alfred Hagart's Household* (1865). He also edited the Globe edition of Burns's works, and wrote for it an excellent memoir of the poet.

Smith, GEORGE, assyriologist, born about 1840, began life as an engraver, but having studied the cuneiform inscriptions of Nineveh, obtained an appointment in the British Museum (1867). A few years later he published the *Annals of Assurbanipal*. In 1872 he made known his striking discovery of a series of tablets in the British Museum containing, amongst other records, the Babylonian legend of the flood. This led to his making two expeditions to the site of Nineveh, resulting in the finding of inscriptions completing portions previously discovered. Particulars of these journeys are recorded in his *Assyrian Discoveries*, published in 1875, and other results were contained in his *Chaldean Account of Genesis* (1876). In 1876 he made another journey to the East for the purpose of continuing his explorations, but died at Aleppo. He wrote, among other works, concise histories of Assyria and Babylon.

Smith, GOLDWIN, LL.D., English historical writer, born at Reading, Berks, in 1823, was educated at Eton and Oxford, where he graduated first-class in classics in 1845 and became fellow of University College in 1846. He also held the post of regius professor of history in the university from 1858 to 1866. As a lecturer he attracted great attention both on account of his strongly democratic views and his striking originality. Having during the American civil war strongly defended the cause of the North, he was at the close of the war invited to visit the States to deliver a course of lectures, and his visit resulted in his accepting the professorship of history at Cornell University, New York. He resigned the appointment in 1871, and was appointed member of the senate of the University of Toronto, where he has ever since resided. Among his chief works are: *Lectures on Modern History* (1861); *The Empire*, a series of letters (1863); *Speeches and Letters on the Rebellion* (1865); *Three English Statesmen* (Pym, Cromwell, and Pitt) (1867); *The United States* (1894); *The United Kingdom* (1899).

Smith, HORACE and JAMES, the joint-authors of the celebrated *Rejected Addresses*, were born, James in 1775, and Horace in 1779. James was a lawyer, Horace a stockbroker, but both were of a literary turn, and frequently contributed to periodicals. In 1812 the competition started by the management for the best poetical address to be read at the opening of Drury Lane Theatre, when rebuilt after the fire, suggested to the Smiths the idea of producing a collection of parodies of the most noted writers of the day, under the designation of the *Rejected Addresses*. The work was hailed with enthusiastic applause, and rapidly ran through numerous editions. Horace also wrote several novels. James died in 1839, Horace in 1849.

Smith, SIR JAMES EDWARD, English botanist, born 1759, died 1828. He studied medicine at Edinburgh, took the degree of M.D. at Leyden, and practised his profession at London, and subsequently at Norwich. The Linnæan Society, of which he continued president till his death, was founded by him in conjunction with others in 1788. He was knighted in 1814. His principal works are *English Botany*, *Flora Britannica*, and the *English Flora*.

Smith, JOHN (commonly known as Captain John Smith), one of the founders of the English colony in Virginia, was born at

SMITH.

Willoughby in Lincolnshire in 1580. After many adventures as a soldier of fortune in Europe, Asia, and Africa, he joined in the project to colonize Virginia. The first expedition, which left London in 1606, consisted of three ships and about 180 colonists and sailors. Dissensions broke out before they had reached their destination, and Smith was condemned to be hanged; but he escaped this fate, and became an active member of the colony. He made important geographical discoveries, obtained supplies from the natives, and was finally intrusted with the guidance of the colony. For a time he was a prisoner among the Indians; but the story of Pocahontas connected with this seems to be, like others of Smith's adventures, undeserving of credibility. In 1609 he was obliged to return to England. He subsequently visited the New England coast for the purpose of trade, and was taken prisoner by a French ship. He died in 1631. He published *A True Relation of the Events connected with the Colonization of Virginia*; *Map of Virginia, with a Description of the Country*; *a Description of New England*; *General History of Virginia*; &c.

Smith, JOHN PYE, D.D., English divine and theologian, born in 1774, became an Independent clergyman, and was long connected with the theological academy at Homerton; died in 1851. He wrote treatises on the Divinity of Christ; *On the Harmony of Geology with Revealed Religion*; *Scripture Testimony to the Messiah*; &c.

Smith, JOSEPH, founder of the Mormons. See *Mormons*.

Smith, ROBERT ANGUS, F.R.S., LL.D., born in Glasgow in 1817, died 1884. He was educated at Glasgow, and subsequently studied chemistry under Liebig at Giessen. After his return to England he made an important report on the sanitary condition of the towns of Lancashire, and his report to the British Association (1848) on the air and water of towns brought the subject into great prominence. Another report of his was on the state of the atmosphere in metalliferous mines. His special investigations into the quality of the air of towns led to his appointment as inspector-general of the alkali works of the United Kingdom. He was also inspector under the Rivers Pollution Act for England and Scotland. The degree of LL.D. was conferred upon him in 1882 by the University of Edinburgh.

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He wrote a *Life of Dalton*, and *History of the Atomic Theory up to his Time*; *Air and Rain: the Beginnings of a Chemical Climatology*; *Loch Etive, and the Sons of Uisnach*; *Science in Early Manchester*; &c.

Smith, SYDNEY, English clergyman, noted for his wit and humour, was born at Woodford, Essex, in 1771; died in 1845. Educated at Winchester School, Sydney in 1789 entered New College, Oxford, where he took his degree of M.A. in 1796, becoming fellow a few years afterwards. In 1797 he obtained the curacy of Netheravon, a village on Salisbury Plain, where he passed a secluded life for about two years. He then went to Edinburgh as tutor to a young gentleman, continued there for five years, and was one of the founders in 1802 of the *Edinburgh Review*, being also one of its most influential contributors. In 1804 he removed to London, about the same time married, and became renowned as one of the wittiest and most genial of men. In 1806 he was presented to the living of Poston-le-Clay, in Yorkshire. In 1807 appeared anonymously his celebrated *Letters of Peter Plymley*, intended to further the cause of Catholic emancipation. His liberal views on politics excluded him for a long time from church preferment; but in 1828 he was presented to the rectory of Combe Florey, in Somersetshire, and in 1831, during the ministry of Earl Grey, he became one of the canons of St. Paul's, London, where he henceforth resided. A few years before his death a collected edition of his writings was published under his own supervision, including papers contributed to the *Edinburgh Review*, *Sketches of Moral Philosophy*, &c.

Smith, THOMAS SOUTHWOOD, M.D., physician and sanitary reformer, was born at Martock, Somersetshire, in 1788, and studied medicine at Edinburgh. He first settled as a physician at Yeovil, but in 1820 went to London, and was in 1825 appointed physician to the London Fever Hospital, and somewhat earlier to the Eastern Dispensary. He spent several years visiting the wards of the former, and the squalid houses of the patients of the latter, and embodied his experience in a *Treatise on Fever* (1830), which has been described by a competent authority as the best work on the subject that has ever been written. In 1832 he was appointed one of the commissioners to inquire into the condition of factory children, and his report led to the passage of the *Factory Act*, which put an end to the inhuman

treatment to which children had been subjected in factories up to that time. His inquiry into the condition of children and young persons employed in mines led to the exclusion of children and women from British mines. In 1846 his report on the means requisite for the improvement of the health of the metropolis resulted in the Public Health Act of 1848. He also did immense service to the cause of science by his reports on cholera and quarantine. Dr. Smith died at Florence in 1861.

Smith, WILLIAM, the 'father of English geology,' born at Churchhill, in Oxfordshire, in 1769; died at Northampton in 1839. Acting successively as land surveyor, mining surveyor, and canal engineer, he was led to indulge in many speculations of a geological nature. He became convinced that each stratum contained its own peculiar fossils, and might be discriminated by them, and in 1815 he was able to submit a complete coloured map of the strata of England and Wales to the Society of Arts, and received the premium of £50 which had for several years been offered for such a map. His fame as an original discoverer was now secure; but becoming involved in pecuniary difficulties he was obliged to part with his geological collection to government for £700. Subsequently a pension was granted to him by government.

Smith, SIR WILLIAM, LL.D., D.C.L., English scholar, born in London 1813, died 1893. He edited the well-known series of Classical, Biblical, and Ecclesiastical Dictionaries, and wrote or edited many educational books. He was for some time classical examiner in London University. From 1867 he was editor of the *Quarterly Review*. He was knighted in 1892.

Smith, WILLIAM HENRY, son of W. H. Smith, bookseller, publisher, and news agent, Strand, London, was born in London in 1825. Educated at Tavistock, he became in due course a member of his father's firm. In 1868 he contested Westminster in the Conservative interest for the second time, and was successful. He continued to sit for Westminster till 1885, when, after the Redistribution Bill, he was returned for the Strand, for which division he was member till his death in 1891. Mr. Smith was a member of the London School Board from 1870 to 1874, and subsequently held the following appointments:—financial secretary to the treasury (1874–77), first lord of the admiralty (1877–80), secretary for war

(1885). In 1886, on the resignation of Lord Randolph Churchill, Mr. Smith vacated the war office, and assumed the leadership of the House of Commons as first lord of the treasury. He received the degree of D.C.L. from Oxford University in 1879.

Smith, WILLIAM ROBERTSON, biblical scholar, was born at Keig, Aberdeenshire, in 1846, and educated at the University of Aberdeen, subsequently spending some time at the New College, Edinburgh, and at the Universities of Bonn and Göttingen. From 1868 to 1870 he held the post of assistant-professor of physics at Edinburgh. Appointed in 1870 professor of Hebrew in the Free Church College, Aberdeen, he was removed from the post by the General Assembly in 1881 on account of his critical views on the Old Testament. From 1881 Professor Smith was connected with the editorship of the *Encyclopædia Britannica*, and after the death of Professor Baynes was editor-in-chief. He was a member of the Old Testament Revision Committee, in 1879–80 travelled in Arabia, in 1883 became Lord Almoner's professor of Arabic at Cambridge, in 1886 librarian of the University, in 1889 professor of Arabic. He is the author, among other works, of *The Old Testament in the Jewish Church* (1880), *The Prophets of Israel and their Place in History to the Close of the 8th Century B.C.* (1882), *Kinship and Marriage in Early Arabia* (1885), and *Religion of the Semites* (1889). He died in 1894.

Smith, ADMIRAL SIR WILLIAM SIDNEY, born in Westminster in 1764, died in 1840. He entered the navy at the age of twelve, received his lieutenantcy at sixteen, and when nineteen was created post-captain. After serving with distinction as a volunteer in the Swedish navy against Russia, and then against France under Lord Hood, he returned to England, and received the command of the *Diamond*, for the purpose of cruising with a small flotilla against the French. He was made prisoner in an attempt to cut out a vessel at Havre, and was detained in confinement for two years, but contrived to make his escape. Appointed then to the *Tiger*, Sir Sidney did good service in Syria, and subsequently in Egypt against Bonaparte, receiving a severe wound at the battle of Alexandria. On his return to England various marks of distinction were bestowed on him, and in 1802 he entered parliament as member for Rochester. He was created rear-admiral of the blue in

1805, and in 1806, as commander of a small squadron, inflicted signal injuries on the French off the coast of Naples. Next year he accompanied Admiral Duckworth to the Dardanelles, where he distinguished himself by the destruction of a Turkish squadron. He was made vice-admiral in 1810, admiral in 1821, and in 1830 succeeded King William IV. as lieutenant-general of marines. As a reward for his services he received a pension of £1000 a year and the decoration of K.C.B.

Smithfield, a square in London, a little north of Newgate and west of Aldersgate, in which, for many hundred years, the only market in London for live stock was held. It was outside the old city walls, and before the days of Tyburn was the place of public executions. In the time of religious intolerance it obtained an evil repute for its burnings in the name of religion. Bartholomew Fair, so often mentioned in our literature, was held at Smithfield. (See *Bartholomew Fair*.) A cattle market was held here as far back as 1150. On the site of the old market there has been erected a fine dead-meat and poultry market.

Smithsonian Institution, a scientific institute in Washington, organized by act of congress in 1846, to carry into effect the provisions of the will of James Smithson, the founder. Smithson was a natural son of the Duke of Northumberland; was educated at Oxford, and was in 1787 elected a fellow of the Royal Society. He died at Genoa in 1829, leaving his property (worth £120,000) to his nephew, with the condition that if the latter died without issue the property was to go to the United States to found an establishment for the increase and diffusion of knowledge. In 1835 the nephew died childless, and in 1838 the sum of 515,169 dollars was paid to the treasury of the United States. In 1846 the interest on this sum (the principal itself must remain untouched) was applied to the erection of a suitable building, with apartments for the reception and arrangement of objects of natural history, including a geological and mineralogical cabinet, a chemical laboratory, a library, a gallery of art, and the necessary lecture-rooms. The building is one of the finest in Washington. A portion of the funds of the institution is devoted to scientific researches and the publication of works too expensive for private enterprise. Three series of publications are issued: Contributions to Knowledge, Miscellaneous Collec-

tions, and Annual Reports. The building contains the National Museum, which is, however, wholly maintained by the government. The institution is administered by regents, composed of the chief-justice of the United States, three members of the senate, and three of the house of representatives, with six other persons, not members of congress. The president, vice-president, and members of the cabinet for the time being have the position of governors or visitors of the institution, the president being *ex officio* at the head.

Smoke, the exhalation or visible vapour that arises from a substance burning. In its more extended sense the word smoke is applied to all the volatile products of combustion, which consist of gaseous exhalations charged with minute portions of carbonaceous matter or soot; but, as often used in reference to what are called smoke-consuming furnaces, the term is frequently employed to express merely the carbonaceous matter which is held in suspension by the gases. By various acts of parliament, and generally by the Public Health Act of 1875, to prevent nuisance from smoke in towns it is provided that all fireplaces, furnaces and chimneys (exclusive of the chimneys of a private dwelling) must be so constructed as to consume their smoke, under a penalty not exceeding £5 nor less than £2, on a second conviction £10. Similar laws apply to railway locomotives and river steamers. But these enactments have only been partially successful. There are many practical difficulties in the way of consuming smoke, but experience has shown that none of them are insuperable. The principle involved is that of mixing air with the combustible vapours and gases generated by the action of heat on the fuel, so that by virtue of a due supply of oxygen they may be made to burn with flame, and become entirely converted into incombustible and invisible vapours and gases.

Smoke-plant, a beautiful deciduous South European shrub, *Rhus cotinus*, natural order Anacardiaceæ, yielding the yellow dyewood called young fustic, and used also in tanning.

Smolensk', a government in Russia, west of Moscow; area, 21,547 square miles; pop. 1,551,068. It consists of extensive plains, and belongs partly to the basin of the Baltic, but much more to the Black Sea. The climate, though cold, is healthy, and the soil tolerably fertile, producing good crops of

rye, hemp and flax, hops and tobacco. The pastures are excellent, and the forests yield excellent timber.—SMOLENSK, the capital, is situated on the Dnieper, 250 miles w.s.w. of Moscow, and is surrounded by old walls and towers. The interior contains much open ground, partly occupied as gardens. The principal buildings are the cathedral, episcopal palace, a diocesan seminary, gymnasium, &c. The manufactures consist of linen, leather, hats, carpets, and soap; and the trade is chiefly in corn and hemp. Smolensk was a place of importance as early as the 9th century, and was partly burned by the French in 1812. Pop. 46,889.

Smollett, **TOBIAS GEORGE**, novelist and miscellaneous writer, was born near Renton in Dumbartonshire in 1721; died at Monte Nuovo, near Leghorn, 1771. He was educated at the University of Glasgow, and was apprenticed to a surgeon. In 1740 he went to London and obtained the situation of surgeon's mate to one of the ships that went out in the unfortunate expedition to Carthage in 1741 under Admiral Vernon. Of this affair he gave an account in his *Compendium of Voyages and Travels* (seven vols. 12mo, 1757). Disgusted with the navy, Smollett quitted the service, and resided for some time in Jamaica. On his return to London in 1746 he heard of the barbarities of the Duke of Cumberland in the north of Scotland, and gave utterance to his indignation in the well-known ode entitled *The Tears of Scotland*. In the same year he published his *Advice: a Satire*; and in 1747 appeared his *Reproof: a Satire*, being the second part of *The Advice*. In 1748 he published his *Adventures of Roderick Random*, a novel which brought him both fame and fortune. He went to Paris in 1750, and about this time wrote his *Adventures of Peregrine Pickle*, which appeared in 1751. He now obtained the degree of M.D., but never succeeded in practice. In 1753 he published his *Count Fathom*, a work neither so ably written nor so popular as its predecessors. In 1755 he brought out a new translation of *Don Quixote*. Soon after this he was induced to take the chief management of the Tory organ, the *Critical Review*. In 1757 he produced *The Reprisal*, a comedy in two acts, which proved a success. In 1758 appeared his *History of England*, from Julius Cæsar to the Treaty of Aix-la-Chapelle in 1748. For a libel in the *Critical Review* he was sentenced to pay a fine of £100 and to suffer three months'

imprisonment. During his confinement he composed his *Adventures of Sir Lancelot Greaves* (published in 1762). In 1761, 1762, and 1765 appeared his *Continuation of the History of England* down to 1765, since often reprinted as a continuation of Hume's History. In 1766, after a residence of about two years on the Continent, he published his *Travels through France and Italy*; and in 1767 his *History and Adventures of an Atom*. He again visited Italy in 1770, and near Leghorn he wrote his *Humphry Clinker*, which is regarded as the best of all his works. The humour of Smollett is of the broad full-flavoured kind, not seldom degenerating into burlesque; his characters are well marked and varied; and though his work is frequently coarse and vulgar, it has had much influence on English fiction.

Smolt. See *Salmon*.

Smuggling, the practice of defrauding the revenue by the clandestine introduction of articles into consumption without paying the duties chargeable upon them. It may be committed indifferently upon the excise or customs revenue.

Smut, a disease, also called *Dust-brand*, incidental to cultivated corn, by which the farina of the grain, together with its proper integuments, and even part of the husk, is converted into a black, soot-like powder. It does not affect the whole body of the crop. Some attribute the smut to the richness of the soil, and others consider it as a hereditary disease transmitted by one generation to another through the seed. It is produced by a minute fungus, *Ustilago* or *Urëdo segetum*. The safest mode for the farmer to pursue to prevent smut, is never to sow grain from a field in which the smut has prevailed. See also *Bunt* and *Ergot*.

Smyrna (Turkish, *Izmir*), an ancient city and seaport of Asiatic Turkey, on the west coast of Asia Minor, at the head of the gulf of the same name. The appearance of the city from the sea is extremely attractive, but a closer inspection dissipates the illusion. The houses, mostly built of wood, are mean and fragile looking; the streets close and filthy, and filled by intolerable stench proceeding from the sewers and drains. The city is divided into four quarters—Frank, Turk, Jew, and Armenian. There is an English hospital, church, and burying-ground, one or two English schools, and numerous schools for Turks, Greeks, and others; all sects and faiths having complete toleration.

Smyrna has been for centuries the most important place of trade in Asia Minor. The chief imports are cotton goods, yarns, sugar, coffee, hardware, haberdashery, petroleum, rice, timber, coal, and iron. The principal exports are raisins, barley, valonia, figs, opium, carpets, cotton, tobacco, beans, hides and skins, emery, bees'-wax, liquorice, and sponges. The origin of Smyrna is lost in antiquity. It laid claim to the honour of being



the birthplace of Homer, and no doubt was a Greek city as early as the date assigned to the poet. It was afterwards taken by the Lydians, was restored by Antigonus and Lysimachus, generals of Alexander the Great, became the capital of Antigonus and a flourishing city. During the Roman civil wars it was taken and partly destroyed by Dolabella, but soon recovered. It early received Christianity, and was one of the 'seven churches' of Asia. In the 13th century only the ruins of its former splendour were left; but after the Turks became masters of the country it revived. It has repeatedly suffered from earthquake. Pop. estimated at 200,000.

Smyrna, GULF OF, formerly the Hermæan Gulf, an inlet of the Ægean Sea on the coast of Asiatic Turkey, so called from the town of Smyrna, which stands at its head. It is 40 miles in length by 20 at its broadest part, and contains several islands and affords good anchorage.

Snail, a slimy, slow-creeping, air-breathing, gasteropod mollusc belonging to the genus *Helix* of Linnaeus, now raised into the family Helicidae, and differing from the slugs (Limacidae) chiefly in having a spiral shell. The head is furnished with four re-

tractile horns or tentacles; and on the superior pair, at the extremity, the eyes are placed. The sexes are united in the same individual, but the union of two such hermaphrodite individuals is necessary for fertilization. The common garden snail (*Helix aspersa*) is the most familiar species of the typical genus. The mischief done by it to garden produce on which it feeds is very extensive. Nearly equally well known is the edible snail (*H. Pomatia*), largely found in France, and cultivated there and elsewhere for food purposes.

Snake, a name equivalent to serpent. (See *Serpents*.) In Britain it is applied especially to the common harmless ringed-snake (which see).

Snake-bird. See *Darter*.

Snake-eel, a popular name of the fishes which constitute the family Ophichthidae of some naturalists, but which others class with the true eels in the family Muraenidae, from the tail tapering to a point like that of a snake. They are natives of warm seas. One species (*Ophichthus serpens*), of about 6 feet long, is found in the Mediterranean.

Snake-fish. See *Band-fish*.

Snake Indians. See *Shoshones*.

Snake River. See *Lewis River*.

Snakeroot, the popular name of numerous American plants of different species and genera, most of which are, or formerly were, reputed to be efficacious as remedies for snake bites. See *Aristolochia* and *Senega*.

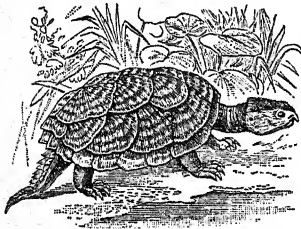
Snake-stone, a popular name of those fossils otherwise called Ammonites. The name is also given to certain small rounded pieces of stone, or other hard substance, popularly believed to be efficacious in curing snake bites.

Snake-wood, the wood of the *Strychnos colubrina*, nat. order Loganiaceæ, a tree growing in India, Java, and other parts of the East, having a bitter taste, and supposed to be a certain remedy for the bite of the hooded serpent. Also the Demerara letter-wood (*Brosimum Aubletii*), a tree of the nat. order Artocarpacæ. It has this name from the heart-wood being mottled with irregularly shaped dark spots. The timber is excessively hard.

Snap-dragon. See *Antirrhinum*.

Snapping-turtle, a species of fresh-water tortoise belonging to the genus *Chelydra* (*C. serpentina*), common to all parts of the United States. It feeds on small animals, is bold and fierce, and is so named from its propensity to snap at everything within its

reach. Another tortoise (*Macrolemmys Temminckii*) of similar habits, but larger



Snapping-turtle (*Chelydra serpentina*).

(sometimes weighing 100 lbs.), receives the same name.

Sneehåtten (snä-het'en; 'Snow-hat'), a mountain in Norway with an altitude of 7566 ft. It rises from the midst of the Dovrefield, an extensive tract of country, from 40 to 50 miles in extent in every direction, and between 3000 and 4000 feet above the sea-level.

Sneek (snäk), a town of Holland, in the province of Friesland. It is partly surrounded by a ditch and an earthen rampart, and is intersected by numerous canals. It has roperies, tanneries, foundries, soap-works, boat-building yards, &c. Pop. 12,078.

Sneeze-wood, a South African tree (*Pterocaylon utile*), nat. order Sapindaceæ, yielding a solid, strong, durable timber rivalling mahogany in beauty. Its dust causes sneezing, so that it is troublesome to work.

Sneezewort (*Achillea ptarmica*), a British composite plant of the milfoil genus, the pulverized leaves of which are said to cause sneezing.

Sneezing is a convulsive action of the respiratory organs brought on commonly by irritation of the nostrils. It is preceded by a deep inspiration, which fills the lungs and then forces the air violently through the nose. Sneezing produced in the ordinary way is a natural and healthy action, throwing off automatically from the delicate membrane of the nostrils whatever irritable or offensive material may chance to be lodged there. When it becomes violent, recourse must be had to soothing the nasal membrane by the application of warm milk and water, or decoction of poppies. The custom of blessing persons when they sneeze is very ancient and very widely spread.

Sniatyn, a town of Austria, in Galicia,

on the Pruth. It was formerly a frontier stronghold, and has extensive tanneries, and a considerable trade in horses and cattle. Pop. 11,500.

Snipe, the English name for those grallatorial birds which form the genus *Scolopax*. The common snipe (*Scolopax gallinago*) is a beautifully marked bird, about 10 or 11 inches long. It is plentiful in most parts of Britain, and frequents marshy or moist grounds. It feeds on worms, insects, and small molluscs. It is remarkable for the length of its bill, its peculiar bleating cry, and the drumming-like noise it makes in summer. The jack snipe (*Scolopax gallinula*) closely resembles the common snipe in its general habits and appearance, but is seldom seen in Britain except in the winter. In North America there are several species of snipe, Wilson's snipe (*S. Wilsoni*) being one of the chief. The name of sea snipe is sometimes given to the dunlin, whilst the



Common Snipe (*Scolopax gallinago*).

name summer snipe is applied to the common sandpiper (which see).

Snipe-fish. See *Bellows-fish*.

Snizort, Loch, a sea loch in the N.W. of the island of Skye, Scotland.

Snorri Sturluson, an Icelandic poet and historian, born in 1178. Tracing his descent from the kings of Norway, he early turned his attention to the history of their doings, and made a collection of sagas entitled the *Heimskringla*, or the *Ring of the World*, in which are interspersed songs of his own composing. It contains a record of the Norwegian kings from the earliest time to the death of Magnus Erlingsson (1177), and was first printed in 1697. It has been translated into several languages. Snorri became chief judge of Iceland, but his ambitious and intriguing character led to his assassination in 1241. His name is also connected with the prose Edda. See *Edda*.

SNOW—SNOW-LINE.

Snow. Snow-flakes are assemblages of minute crystals of ice; they are formed when the temperature in a region of air containing a considerable quantity of aqueous vapour is lowered below the freezing-point. The particles of moisture contained in the atmosphere are then condensed and frozen, and form flakes, which descend to the earth. Each flake which falls is composed of a number of minute crystals of ice, which present countless modifications of the hexagonal system. They have great diversities of density, and display innumerable varieties of the most beautiful forms. These crystals usually adhere together to form an irregular cluster; and consequently the incident rays of light, which are refracted and reflected so as to present individually the prismatic colours, are scattered after reflection in all directions, and combine to give to the eye the colour sensation of *white*. When sufficient pressure is applied the slightly adhering crystals are brought into true molecular contact, when the snow, losing its white colour, assumes the form of ice. Snow answers many valuable purposes in the economy of nature. Accumulated upon high regions it serves to feed, by its gradual melting, streams of running water, which a sudden increase of water, in the form of rain, would convert into destructive torrents or standing pools; and in many countries it tempers the burning heats of summer by previously cooling the breezes which pass over them. In severer climates it serves as a defence against the rigours of winter by protecting vegetation from the frost, and by affording a shelter to animals which bury themselves under it. Even in more temperate climates it is found that vegetation suffers more from an open winter than when the fields, during that season, lie hid beneath a snowy covering. As for what is known as *red snow*, see *Protococcus*.

Snow, a vessel equipped with two masts resembling the main and fore masts of a ship, and a third small mast, just abaft the main-mast, carrying a sail nearly similar to a ship's mizzen.

Snowball-tree, the garden variety of the *Viburnum Opulus* (natural order Caprifoliaceae) or guelder-rose (which see).

Snowberry, the popular name of tropical American shrubs of the genus *Chiococca*, natural order Rubiaceae, sub-order Cinchonae. The fruit consists of snow-white berries. Also, and in England more usually, applied to *Symphoricarpos racemösus*, a

bushy shrub of the woodbine family, a native of N. America, bearing white berries.

Snow-bird, a popular name applied to several species of birds, such as the *Fringilla nivälis* of Europe, the *Fringilla hie-mälis* of America, and the snow-bunting.

Snow-bunting, the popular name of *Emberiza* or *Plectrophanes nivälis*, a gregarious passerine bird belonging to the bunting family, a native of the arctic regions. In winter it visits Britain and other temperate regions, and is supposed to be the harbinger of severe weather. It sings very sweetly, and does not perch, but runs about like the lark. Called also *Snow-fleck*.

Snowdon, a mountain range in North Wales, stretching N.N.E. to S.S.W. across Carnarvonshire, from the mouth of the Conway to Tremadoc; length, about 24 miles; average breadth, 6 miles. It attains its greatest height in Snowdon proper—3560 feet—the culminating point of South Britain, now climbed by mountain railway.

Snowdrop, a well-known garden plant of the genus *Galanthus*, the *G. nivälis*, nat. order Amaryllidaceae. It bears solitary, drooping, and elegant white flowers, which appear in February. It is naturalized in Britain, and found in woods, orchards, meadows, pastures, &c.

Snowdrop Tree (*Halesia tetrapetära* and *H. diptera*), a name of ornamental trees of the Southern U. States with flowers like snowdrops, belonging to the styrax family.

Snowflake. See *Leucojum*.

Snow-goose (*Anser hyperboreus*), a species of goose inhabiting the arctic regions. Its flesh is esteemed excellent.

Snow-line, the limit of perpetual snow, or the line above which mountains are covered with perpetual snow. Since the temperature of the atmosphere continually diminishes as we ascend from the lower into the higher strata, there must be in every latitude a certain limit of elevation at which the temperature of the air is reduced to the freezing-point. This limit is called the snow-line, or line of perpetual congelation, and the mountains which rise above it are always covered with snow. The snow-line varies according to latitude, being highest near the equator and lowest near the poles. Local circumstances, however, affect it, as the configuration of the country, the quantity of snow falling annually, the nature of the prevalent winds, &c. From these circumstances the snow-line is at different heights in the same latitude.

Snow-plant. Same as *Protococcus*.

Snow-plough, an implement for clearing away the snow from roads, railways, &c. There are two kinds: one adapted to be hauled by horses, oxen, &c., on a common highway; the other to be placed in front of a locomotive to clear the rails of snow. A variety of the latter is adapted to street trainways.

Snow-shoe, a kind of flat shoe, either made of wood alone, or consisting of a light frame crossed and recrossed by thongs, the



Snow-shoe.

broad surface of which prevents the wearer from sinking in the snow. Snow-shoes are usually from 3 to 4 feet in length, and from 1 to 1½ foot broad across the middle.

Snowy River, a river of Australia, in New South Wales and Victoria; length, 240 miles, 160 of which are in New South Wales.

Snuff, a powdered preparation of tobacco inhaled through the nose. It is made by grinding, in mortars or mills, the chopped leaves and stalks of tobacco in which fermentation has been induced by moisture and warmth. The tobacco is well dried previous to grinding, and this is carried sometimes so far as to give to the snuff the peculiar flavour of the high-dried snuffs, such as the Irish, Welsh, and Scotch. Some varieties, as the rappees, are moist. The admixture of different flavouring agents and delicate scents has given rise to fanciful names for snuffs, which, the flavour excepted, are identical. Dry snuffs are often adulterated with quicklime, and the moist kinds with ammonia, hellebore, pearl-ash, &c. See *Tobacco*.

Snyders, FRANS, Flemish painter, born at Antwerp in 1579, studied the rudiments of his art under Breughel and Van Balen. Later he visited Italy, but in 1609 finally took up his abode at Antwerp, and died there in 1657. Snyders, who is considered never to have been surpassed in his delineation of dead game, fish, fruit, &c., excelled also in hunting scenes and combats of wild

beasts. He used to work in concert with Rubens. Choice pieces of his are to be found in the collections at Munich, Vienna, and Dresden, in the Escorial, in the Louvre, and in some private English collections.

Soane, SIR JOHN, English architect, born in 1753, studied at the Royal Academy, was sent to Rome for three years with the Academy pension of £60 a year, and on his return he was employed on many public works. In 1788 he was appointed architect to the Bank of England, and in 1791 clerk of works to St. James's Palace, the Parliament Houses, and other public buildings. In 1794 he drew up plans for the improvement of the House of Lords, but though they were accepted James Wyatt was engaged to carry them out. He became professor of architecture to the Royal Academy in 1806. He died in 1837, having bequeathed his collection of works of art and £30,000 to the nation. The *Soane Museum* thus formed is housed at 13 Lincoln's Inn Fields, London, and contains antique sculptures, bronzes, gems, models of ancient buildings, a collection of pictures, &c.

Soap, a substance of common domestic use for washing and cleansing, and also used in medicine, &c. Soaps consist of the metallic salts of the acids present in common fats and oils in the form of glycerides. The common soaps are either potassic or sodic salts of the three acids palmitic, stearic, and oleic. These soaps are manufactured by boiling the glycerides, *e.g.* tallow, grease, palm-oil, olive-oil, &c., with an alkali, usually crude caustic potash or caustic soda solution. This process is known as saponification and gives rise to the potassium or sodium salts of the acids together with glycerine, which in modern soap-works is usually recovered. The hard soaps (sodium soaps) are readily obtained by the addition of common salt to the saponified mixture; the process is known as *salting out*, and the soap rising to the surface may be removed and pressed into a cake. The soft soaps, which are mainly potassic salts, are obtained by saponifying the fat with caustic potash and evaporating the mass to a syrupy consistency; in addition to the potassic salts it contains glycerine, and usually an excess of free alkali. In the common yellow soaps a certain amount of resin is usually added to the fat before it is hydrolysed, so that the soap contains salts of resin acids. The better class soaps (toilet soaps) are usually remelted, mixed with a perfume, and pressed

into the form of cakes. Transparent soaps are made by dissolving the soap in alcohol, adding glycerine or sugar, and evaporating the alcohol. Mottled soap is made by simply adding mineral and other colours during the manufacture of ordinary hard soap. Marine soap, which has the property of dissolving as well in salt-water as in fresh, is made of cocoa-nut oil, soda, and water. Medicinal soap is prepared from caustic soda, and either olive or almond oil. It is chiefly employed to form pills of a gently aperient antacid action. The manufacture of soap is an industry of great importance at the present day.

Soap-berry, the name applied to the fruit of several species of the genus *Sapindus* (nat. order Sapindaceæ) from their rind containing a saponaceous principle, so that when mixed with water they produce an abundant lather. The fruit is globular, as large as a cherry, inclosing a nut of a shining black colour when ripe.

Soap-plant, a name common to several plants used in place of soap, as the *Phalangium pomaridianum*, a Californian plant, whose bulb, when rubbed on wet clothes, raises a lather, its smell somewhat resembling that of new brown soap.

Soap-stone, steatite. The name is derived from its colour, and from the unctuous sensation experienced when the mineral is rubbed between the hands. See *Steatite*.

Soap-wort (*Saponaria*), a genus of plants of the natural order Caryophyllaceæ; so called because the bruised leaves produce a lather like soap when agitated in the water. Common soap-wort (*S. officinalis*) is a native of many parts of Europe, and is found on waysides, river-banks, and thickets; in Britain it is found in alluvial meadows and under hedges. *S. calabrica* has numerous small pink flowers, and is one of the most elegant flowers in English gardens.

Soar, a river of England, which flows north through Leicestershire, taking Leicester on its course, and joins the Trent about 12 miles E.S.E. of Derby, whence to Leicester it is navigable by barges.

Sobieski, JOHN. See *John III.* (*Sobieski*).

Sobranje, or **SOBRANYE**, the national assembly of Bulgaria (which see).

Sobra'on, a village of India, in the Punjab, on the left bank of the Sutlej, 50 miles S.S.E. of Lahore, is noted as the scene of a great battle on 10th February, 1846, between the Sikhs and the British under Lord

Gough, in which the former were defeated. Pop. 4164.

Soc, SOKE, in law, the power or privilege of holding a court in a district, as in a manor; jurisdiction of causes, and the limits of that jurisdiction.

Socage, or **SOCAGE**, in law, a tenure of lands in England by the performance of certain and determinate service: distinguished both from *knight-service*, in which the render was uncertain, and from *villennage*, where the service was of the meanest kind. Socage has generally been distinguished into *free* and *villain-free socage*, where the service was not only certain but honourable, and *villain socage*, where the service, though certain, was of a baser nature.

Sociable, an open carriage with seats facing each other, and thus convenient for conversation; also a species of tricycle.

Social Democrats, an advanced body of socialists. They originated and are chiefly represented in Germany, where they form a strong political party. The Social Democratic Working Men's Party was established in 1869. In 1875 they formulated a programme, which sets forth that labour is the source of all wealth and all culture, and that the emancipation of labour must be the work of the labouring classes. The party aims at the development of a free state and a socialistic society, the removal of all social and political inequality, the administration of justice free and impartial by the people, and the establishment of a gratuitous and universal system of education. Religion is to be regarded as a private concern merely. The social democrats are a growing body in England and America.

Social Insects, the name applied generally to the species of bees, wasps, hornets, ants, white-ants or termites, &c., which live in communities, and evince in the order of their life a close analogy to societies of mankind.

Socialism, the name applied to various theories of social organization, having for their common aim the abolition of that individual action on which modern societies depend, and the substitution of a regulated system of co-operative action. The word socialism, which originated among the English communists, and was assumed by them to designate their own doctrine, is now employed in a larger sense, not necessarily implying communism or the entire abolition of private property, but applied to any system

which requires that the land and the instruments of production shall be the property, not of individuals, but of communities, or associations, or of the government, with the view to an equitable distribution of the products. It is looked on by those who believe in it as an evolutionary phase of society, as indeed a natural development—slavery gave way to feudalism, feudalism to capitalism, and the latter is bound to fall before the latest stage, socialism. The earliest and most concrete forms of socialist philosophy are those promulgated by Robert Owen, St. Simon, and Fourier, some account of which and of the unsuccessful attempts to test them in practice is given under these names. Later theorists on the social question have taken wider, and even wilder views, their theories often ramifying into the more or less vague and disruptive schemes of the anarchists and nihilists. The chief socialistic bodies in Britain consist of the Independent Labour Party, the Social Democratic Federation, and the Fabian Society. The literature on the subject is very extensive, and has had an important influence on modern thought, and, indeed, upon constructive legislation. Among the leading works to be consulted are Karl Marx's *Capital*; Fourier's *Œuvres Complètes*; Comte's *Traité de Sociologie*; Louis Blanc's *L'Organisation du Travail*; Hyndman's *Historical Basis of Socialism in England*, and *Economics of Socialism*; *The Fabian Essays*; &c.

Social Science, the science that deals with the social condition, the relations, and institutions which are involved in man's existence and his well-being as a member of an organized community. It concerns itself more especially with questions relating to public health, education, labour, punishment of crime, reformation of criminals, pauperism, and the like. It thus deals with the effect of existing social forces, and their result on the general well-being of the community, without directly discussing or expounding the theories or examining the problems of sociology, of which it may be considered as a branch.

Social Science Association, the popular name of the National Association for the Promotion of Social Science, a British society, established in 1857. The Society for Promoting the Amendment of the Law was united with it in 1864. It held annual meetings up till 1884.

Society Islands, an important group of

islands of the South Pacific, between lat. 16° 11' and 17° 53' s., and lon. 148° and 155° w.; and between the Low Islands on the east and the Friendly Islands on the west. The group consists of the principal island of Tahiti or Otahete—which is about 32 miles long, and is divided into two peninsulas by an isthmus about 3 miles broad; area, 412 square miles—and a number of comparatively small islands, Eimeo, Raiatea, Huahine, &c., all now belonging to France. All the islands are elevated, and more or less mountainous. In Tahiti, which consists of an elongated ridge, the loftiest summit, Orohena, is 7339 feet above the sea, while two other summits near it are respectively 7323 feet and 6675 feet. The scenery of this and the other islands is frequently surpassingly beautiful. Cotton, copra, coffee, sugar, pearl-shell, &c., are exported. The Society Islands were first discovered in 1606 by Pedro Fernandez di Quiros, who gave to Tahiti the name of *La Sagittaria*. In 1767 Captain Wallis, sent by George III. to make discoveries in the Pacific, reached Tahiti, and believing himself the first discoverer gave it the name of King George Island. Two years later Captain Cook, in company with Sir Joseph Banks and a scientific staff, visited the island for the purpose of observing the transit of Venus. On this occasion Cook discovered several of the north-west group, and gave to the whole the name of Society Islands in honour of the Royal Society. These discoveries excited the deepest interest in Great Britain, and one of its more immediate results was the formation of the London Missionary Society, to civilize and Christianize the natives. They readily came under the influence of the missionaries, and were being rapidly formed into regular Christian communities, when an untoward event happened in the arrival of French priests, whose anxiety to proselytize led first to troubles, and then to the establishment of a French protectorate (1844) over the islands, which latterly have become simply a French colony. Pop. estimated at about 18,000.

Socinians. See *Socinus* and *Unitarians*.

Socinus, the Latinized name of two celebrated theologians, uncle and nephew, who have given their name to a religious sect, the Socinians, whose modified doctrines are now known as Unitarianism. — **LAELIUS SOCINUS** (LELIO SOZZINI), born in 1525 at Siena, in Tuscany, and destined for the legal profession, abandoned jurisprudence for the

study of the Scriptures. In 1546 he was admitted a member of a secret society at Vicenza, formed for the discussion of religious questions, which arrived at the conclusion that the doctrine of the Trinity was untenable, and that many of the dogmas of the Roman Catholic Church were repugnant to reason. The nature of their deliberations having become known the society was broken up, several of its members put to death, and others, among whom was Socinus, fled the country. He visited France, England, Holland, &c., and resided for some time in Poland, where he found many persons who were in sympathy with his views. He died at Zürich in 1562. He is the author of *Dialogus inter Calvinum et Vaticanum*, *De Sacramentis*, *De Resurrectione Corporum*, and several unfinished works. — FAUSTUS SOCIUS (FAUSTO SOZZINI), a nephew of the preceding, born at Siena in 1539, was obliged to leave that town in his twentieth year on account of his heretical notions. On the death of his uncle he came into possession of the manuscripts of the latter, by the study of which he found his former opinions confirmed. He began to publish his views at Florence (where he lived twelve years at the court of the grand-duke, Francesco de' Medici) in anonymous writings, but afterwards retired to Basel to escape the Inquisition. His opinions were still more fully developed during a residence in Transylvania, and in Poland he had numerous adherents. His death took place in 1604. See *Unitarians*.

Sociology, the science which investigates the laws of forces which regulate human society in all its grades, existing and historical, savage and civilized; or the science which treats of the general structure of society, the laws of its development, and the progress of actual civilization. Comte was the first to treat the subject from a scientific point of view. He was followed by Quetelet and Herbert Spencer. See Comte's *Traité de Sociologie* and Spencer's *Study of Sociology* (1874), and *Principles of Sociology* (1876-96, 3 vols.).

Sock (Lat. *soccus*), a low shoe or slipper, worn by the Greeks, and also by the Roman women, who had them highly ornamented. They were likewise worn by comic actors, the buskin, or cothurnus, being used in tragedy; hence sock and buskin are used figuratively as equivalent to comedy and tragedy.

Socorro, a town of the South American

Republic of Colombia, in a very hot and unhealthy district, 150 miles N.E. of Bogotá. It has manufactures of cotton goods and straw hats, and a considerable trade with the surrounding districts. Pop. 20,000.

Soco'tra, an island in the Indian Ocean, about 150 miles E.N.E. of Cape Guardafui; 71 by 22 miles; area, 1380 sq. miles. Aloes, tamarinds, and dates are the chief productions. Cattle, sheep, goats, and asses are plentiful, and the climate is comparatively cool and temperate. The inhabitants are chiefly a mixed race of Arabs, Indians, Africans, and Portuguese. The island was annexed by Britain in 1886. Pop. 12,000.

Soc'rates (-tēz), an ancient Greek philosopher, born at Athens in or about 469 B.C. His father, Sophroniscus, was a sculptor, and Socrates himself

for a time followed this occupation. He served as a common soldier in the campaign of Potidæa (432-429 B.C.), fought at the battle of Delium (424), and in 422 he marched with Cleon against Amphipolis. In these campaigns his bravery and endurance were conspicuous; and

he was the means of saving the lives of Alcibiades and Xenophon. After the naval battle of Arginusæ (406) against the Spartans, ten Athenian officers were arraigned for neglecting the sacred duty of burying the slain. The clamour for their condemnation rose so high that the court wished to proceed in violation of all legal forms; but Socrates, the presiding judge at the trial, refused to put the question. Soon after he was summoned by the tyrannical government of the Thirty to proceed with four other persons to Salamis to bring back an Athenian citizen who had retired thither to escape the rapacity of the new government. Socrates alone refused. After this he declined to take any further share in public affairs, giving as a reason the warnings of an internal voice of which he was wont to speak. Following the promptings of this divine mentor he trained himself to coarse fare, scanty clothing, and indifference to heat or



Socrates, from ancient bust.

cold, and brought into thorough subjection his naturally impetuous passions. But though a sage he was wholly removed from the gloom and constraint of asceticism; he indeed exemplified the finest Athenian social culture, was a witty as well as a serious disputant, and did not refrain from festive enjoyment. Of his wife Xanthippe, all that has passed into history is that she bore him three sons, and that she was an arrant shrew. Socrates wrote nothing, and neither sought to found a school nor a system of philosophy. His plan was to mix with men freely in any place of public resort, when he questioned and suggested the right path to real knowledge. Ignorance and pretence could not be hidden when his cross-examination came to bear on them, and he thus created many enemies. Aristophanes attacked him violently in his Comedy of the Clouds as a sophist, an enemy of religion, and a corrupter of youth. But he had many distinguished friends, such as Plato, Xenophon, Euclid of Megara, Antisthenes, Aristippus, Æschines, and Alcibiades. In 399 B.C. a formal accusation was brought against him by Anytus, a leading demagogue; Meletus, a tragic poet, and Lycon, an orator, charging him with not believing in the gods which the state worshipped, with introducing new divinities, and with corrupting youth. The trial took place before a law-court composed of citizen judges. His bold defence is preserved by Plato, under the title of the *Apology of Socrates*. He dwelt on his mission to convict men of their ignorance for their ultimate benefit; declared himself a public blessing to the Athenians; assuring them if his life were spared he would continue in the same course; and regarded the approach of death with utter indifference. He was condemned to death by a majority of his judges; refused help to escape, and thirty days after his sentence drank the hemlock cup with composure, and died in his 70th year (B.C. 399). The account of his last hours is given in full detail in the *Phædo* of Plato. In their accounts of the life of Socrates the two principal authorities, Xenophon and Plato, substantially agree. It should be borne in mind, however, that Plato in his *Dialogues* generally presents his own thoughts through the mouth of Socrates, and that it is often difficult to discriminate between the Platonic and Socratic elements. While the previous philosophies consisted of vague speculations on nature as a whole, combining cosmology, astronomy, geography, physics,

metaphysics, &c., Socrates arrived at the conclusion that the knowledge he had gained was of little practical value; and the speculations of philosophers, from Thales downwards, as to the origin of all things out of fire, water, air, &c., he regarded as profitless. Men's strivings after knowledge, he opined, should be directed to the human relationships as involving men's practical concerns. Self-knowledge is the condition of practical excellence. He introduced no formal system of ethics and no reasoned system of dialectics, but he paved the way for other philosophers to take up these subjects and work them out; and thus his teaching was the precursor of Platonism and the Aristotelian logic, and of all the often conflicting systems which rose into more or less importance for ten successive centuries.

Soda, a term applied, in common language, to three different substances—namely sodium oxide (Na_2O), sodium hydroxide (NaOH), and sodium carbonate (Na_2CO_3). In scientific language, however, the name is given to the oxide only (Na_2O), the hydroxide being frequently called *caustic soda*. The protoxide of sodium is formed, together with a peroxide, Na_2O_2 , when sodium is burned in dry air or oxygen. It is a white powder, which abstracts moisture and carbon dioxide from the air. When this protoxide is dissolved in water, a solution of the hydrated oxide or sodium hydroxide (NaOH) is obtained. This substance closely resembles caustic potash; it is a white solid, readily soluble in water or alcohol, and the solution has strongly alkaline properties. It has a corrosive action on animal and vegetable tissues. It forms soaps when boiled with tallow, oils, wax, rosin; dissolves wool, hair, silk, horn, alumina, silica, sulphur, and some metallic sulphides. It neutralizes acids, forming salts, all of which are soluble in water, and many of which crystallize well. The carbonate ($\text{Na}_2\text{CO}_3 \cdot 10 \text{H}_2\text{O}$) is the soda of commerce in various forms, either crystallized in lumps or in a crude powder called *soda-ash*. It is obtained from the ash of plants growing near the sea, from native sources, or by chemical processes. The soda obtained from plants contains from 3 to 30 per cent of carbonate. Small amounts are imported from various parts of Europe, and from California and Virginia, but the great mass is manufactured in this country from common salt. The first process consists in converting the com-

mon salt (sodium chloride) into sodium sulphate by means of oil of vitriol. An important by-product in this process is hydrochloric acid gas (HCl). This first process is termed the *salt-cake process*, from the name salt-cake given to the crude sodium sulphate. The second process consists in converting the salt-cake into crude sodium carbonate (black ash) by strongly heating it with chalk and coal in a revolving furnace. The black ash is extracted with water, which dissolves the crude carbonate, leaving calcium sulphide and other waste products undissolved. From these latter sulphur is now usually recovered. The soda can either be obtained in the form of large crystals (washing soda), or of a fine dry powder. Other methods of obtaining the carbonate are by the ammonia-soda process of Solvay, and by an electrolytic process. The chief uses of soda are in the manufacture of glass and of hard soap. The carbonate of soda is used in washing, and is a powerful detergent.

Soda-water, an effervescing drink generally consisting of ordinary water into which carbon dioxide has been forced under pressure. It rarely contains soda in any form. It is useful in cases of debility of the stomach, accompanied with acidity.

Sodium, the metal present in all sodic salts; symbol Na (from *Natrium*), atomic weight 23.05. It was discovered by Sir Humphry Davy in the year 1807. Previously the hydroxide of the metal was regarded as an elementary body, but Davy succeeded in decomposing it into oxygen and a new metal by the passage of an electric current through the fused alkali. Gay-Lussac and Thénard soon afterwards procured it in greater quantity by decomposing the hydroxide by means of iron; and Brunner showed that it may be prepared with much greater facility by distilling a mixture of sodium carbonate with charcoal: it is now prepared by the latter process in considerable quantities, and also by the electrolysis of the fused hydroxide or chloride. Sodium is a silver-white metal, having a very high lustre. Its specific gravity is 0.973; it melts at 204° Fahr., and oxidizes rapidly in the air, though not so rapidly as potassium. It decomposes water instantly, but does not spontaneously take fire when thrown on water, unless the water be somewhat warm, or the progress of the globule of sodium upon the surface of the water be impeded. When heated in air or oxygen it

takes fire and burns with a very pure and intense yellow flame. It is perhaps more abundant on our globe than any other metal, for it constitutes two-fifths of all the sea-salt existing in sea-water, in the water of springs, rivers, and lakes, in almost all soils, and in the form of rock-salt. It is used as an agent in the manufacture of aluminium and magnesium, and as a reagent in chemical operations. Common salt is a compound of chlorine with sodium. Sodium is also a constituent of many minerals. Its compounds exist in sea plants, and in most animal fluids. For its more important salts see *Soda*, *Cubic Nitre*, *Borax*. The sulphate is termed Glauber's salt.

Sodom, the principal of the five cities (Sodom, Gomorrah, Admah, Zeboim, and Zoar) described in the book of Genesis as the cities of the plain (*i.e.* of Jordan). They were overthrown on account of the wickedness of the inhabitants (Gen. xix.), with the exception of Zoar, which was spared at the supplication of Lot. Modern writers are not agreed as to the site of these cities.

Sodom, APPLE OF, a fruit mentioned by early writers as growing on the shores of the Dead Sea, which was beautiful to the eye, but when eaten filled the mouth with ashes; supposed to have been a gall produced on dwarf oaks by an insect, or the fruit of a species of *Solanum*.

So'doma (or So-dō'ma), IL, the usual name of *Giovanni Antonio Bazzi*, an Italian painter, born at Vercelli 1477. He was strongly influenced by Leonardo, and worked in Rome, but mainly in Siena, where he can be best studied. He died in 1549.

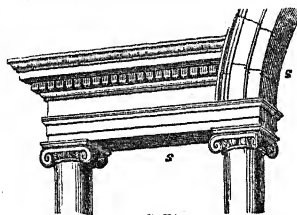
Sodor and Man, BISHOPRIC OF, the title of the bishop of the see of Man, who has a seat, but not a vote, in the House of Lords. The name Sodor is a form of the Scandinavian Sudreyjar or Sudreys, that is 'Southern Isles', the southern division of the Hebrides or Western Isles.

Soerabaya (sō-rā-bā'yā). See *Sourabaya*.

Soest (zöst), an ancient town of Prussia, in the province of Westphalia, with dark winding streets, several interesting churches, including a Byzantine cathedral and a fine pointed Gothic church. It has puddling-works and rolling-mills, tanneries, breweries, distilleries, soap-works, &c. Pop. 16,721.

Sofa'la, a village belonging to the Portuguese since 1505, on the south-east coast of Africa, on the Mozambique Channel, south-west of Beira. Pop. 2000.

Soffit, in architecture, any ceiling divided into square compartments or panels; also



s s, Soffits.

the lower surface of an architrave, an arch, a balcony, a cornice, &c.

Sof'ia, *So'PHIA*, the capital of the kingdom of Bulgaria, is situated in a plain on the river Bogana, near the foot of the north side of the Balkan Mountains, 310 miles W.N.W. of Constantinople. Great part of it has been recently built or rebuilt, and there are now handsome modern streets and edifices. The town is the see of a Greek archbishop; and has extensive bazaars, and a considerable trade, chiefly in the hands of Greeks and Armenians. Sofia was founded by the Emperor Justinian on the ruins of the ancient Sardica. Pop. 82,600.

Sofism. See *Sufism*.

Softas, in Turkey, persons withdrawn from the world and devoted to the study of Mohammedan law and religion, mostly a set of bigots opposed to all reforms.

Soft-grass. See *Holcus*.

Sogdia'na, anciently the most northern province of the Persian empire, reaching to the Jaxartes.

Sog'neffjord, an extensive fjord on the west coast of Norway, exhibiting magnificent rock and glacier scenery.

Sohar', an important seaport of S.E. Arabia, on the coast of Oman. Pop. 24,000.

Soignies (*swân-yê*), a town of Belgium, in the province of Hainault, with regular streets and well-built houses; Romanesque church of the 12th century, and a town-hall in the Spanish style. Pop. 10,124.

Soil, mould, or that compound earthy substance which furnishes nutriment to plants, or which is particularly adapted to support and nourish them. Wherever the surface of the earth is not covered with water, or is not naked rock, there is a layer of earth more or less mixed with the remains of animal and vegetable substances in a state of decomposition, which is commonly called the *soil*. In uncultivated grounds soils

generally occupy only a few inches in depth on the surface; in cultivated grounds their depth is generally the same as that to which the implements used in cultivation have penetrated. The stratum which lies immediately under the soil is called the subsoil, which is comparatively without organized matter. Soil is composed of certain mixtures or combinations of the following substances: the earths, silica, alumina, lime, magnesia; the alkalies, potassa, soda, and ammonia; oxide of iron and small portions of other metallic oxides; a considerable proportion of moisture, and several gases, as oxygen, hydrogen, carbonic acid. Besides these every soil contains vegetable and animal matters, either partially or wholly decomposed. See *Agriculture*, *Manures*.

Soiling, in agriculture, the practice of supporting animals in the summer season with green food of different sorts, cut daily, and given to them in racks in the stalls or yards, instead of sending them to the fields.

Soissons (*swâ-sôn*), a city of France, in the department of the Aisne, and on the river Aisne, 51 miles north-east of Paris. It is a fortress of the second rank, and has some old and interesting buildings, including a fine cathedral (12th-13th century), old churches, remains of an abbey, &c. Soissons was taken by the Germans in 1870 after four days' resistance. Pop. 13,240.

Soko, the native name for a quadrumanous mammal closely allied to the chimpanzee, discovered by Dr. Livingstone at Manyuema, near Lake Tanganyika, in Central Africa. The flesh is esteemed a delicacy by the natives. It feeds on wild fruits. The soko is described as harmless, except when attacked.

Sok'oto, a town in Northern Nigeria, on the Sokoto, which falls into the Niger. It is surrounded by lofty walls, is fairly well built, and has regular streets, several mosques, manufactures of cotton cloth, and carries on an extensive trade. It was occupied by British troops in 1903. Pop. 20,000.—The same name belonged to an extensive Fellata kingdom, of which the town was formerly the capital. The country is now being opened up to British trade, and Sokoto forms a province, under a sultan and a British resident.

Solana'ceæ, a natural order of monopetalous exogenous plants, composed of herbs or shrubs, natives of most parts of the world, and especially within the tropics. They have alternate leaves, terminal or axillary inflorescence, and regular, or nearly

regular, monopetalous flowers. The nightshade, potato, capsicum, tomato, egg-plant, and tobacco are all of this order, the typical genus being *Solanum*, which contains the potato, bittersweet, egg-plant, and numerous other species. The general property of the order is narcotic or poisonous. This prevails to a greater or less degree in all the members, although certain parts of the plants, when cultivated, are used for food.

Solan'der, DANIEL CHARLES, a Swedish botanist, born 1786, studied under Linnæus, settled in England in 1760, became connected with the British Museum, accompanied Sir Joseph Banks in Cook's first voyage round the world in 1768-71, and died in 1782.

Solan Goose. See *Gannet*.

Sol'anine, a vegetable alkaloid obtained from various species of *Solanum*, as *S. Dulcamara*, *S. nigrum*, *S. crispum*, &c. It forms a crystalline powder, very bitter and acrid, and highly poisonous. It is insoluble in water, but dissolves in alcohol. With acids it forms salts, which are uncrystallizable.

Solar Corona. See *Corona*.

Solar Day. See *Day*.

Solar Engine, an apparatus for utilizing the heat of the sun as a motive power, by causing it, through the medium of a reflecting metallic mirror, to heat the water in a small boiler and convert it into steam.

Solar Microscope, an instrument by means of which a magnified image of a small transparent object is projected on a screen, the light employed being sunlight. It is really a magic lantern, in which the microscopic object is affixed to a clear glass plate, and the light employed bright sunlight reflected into the instrument.

Solar Prominences, red flame-like masses seen in the atmosphere of the sun at a total solar eclipse. See *Sun*.

Solar System, in astronomy, that system of which the sun is the centre. To this system belong the planets, planetoids, satellites, comets, and meteorites, which all directly or indirectly revolve round the sun, the whole being bound together by the mutual attractions of the several parts. See *Astronomy*, *Planets*, *Sun*, *Moon*, *Gravitation*, &c.

Solar Time, time as indicated by a sundial. The successive hours so indicated are not equal intervals of time. See *Day*, *Equation of Time*.

Solatium, in Scots law, a sum of money paid over and above actual damages, to an

injured party, as a *solace* for wounded feelings. In English law such compensation is not in strict principle admitted, but in practice there is no substantial difference.

Soldanella, a genus of plants, nat. order Primulaceæ. The species are small herbs of graceful habit, natives of alpine districts of Continental Europe. One of them, *S. alpina*, a native of Switzerland, with lovely blue flowers, is well known as an object of culture.

Solders, metallic cements or fusible alloys used for joining metals together. They may be regarded as solid solutions of one metal, or of a compound of two or more metals in another. The solder should always be more fusible than the metals which it is to unite, and should possess about the same hardness and malleability as these. Hard solders are ductile, will bear hammering, fuse at a relatively high temperature, and are commonly prepared by mixing a portion of the same metal it is required to unite with some other in order to lower its temperature of fusion. Under this head comes the hard solder for gold, which is prepared from gold and silver, or gold and copper, or gold, silver, and copper. The hard solder for silver is prepared from equal parts of silver and brass, but is rendered more fusible by the admixture of one-sixteenth of zinc. The hard solder for brass is obtained from brass mixed with a sixth, or an eighth, or even one-half of zinc, which may also be used for the hard solder of copper. The soft solders melt easily, but are partly brittle, and therefore cannot be hammered. Of this kind are the following mixtures: tin and lead in equal parts; bismuth, tin, and lead in equal parts; one or two parts of bismuth, of tin and lead each one part. In soldering, the surfaces to be united must be made perfectly clean and free from oxide. This is commonly effected by scraping the surfaces; and in order that the formation of any oxide may be prevented during the process, borax, sal ammoniac, or rosin is used, either mixed with the solder or applied to the surfaces.—**Autogenous soldering** is the union of two pieces of metal without the intervention of any solder, by fusing them at the point of junction by means of a blowpipe flame.

Soldier. See *Army*, *Conscription*, *Enlistment*, *Militia*, &c.

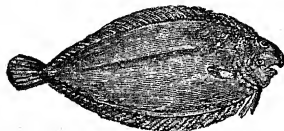
Soldier-ants. See *Termites*.

Soldier-beetle, a name given to carnivorous coleopterous insects of the genus

Telephorus, from their reddish colour, or from their combativeness.

Soldier-crab. See *Hermit-crab*.

Sole (*Solēa vulgaris*), a marine fish belonging to the *Pleuronectidæ* or flat-fishes, of an oblong or oval form. These fish abound on the British coast, and also on all the coasts of Europe, except the most northern, where the bottom is sandy. They furnish



Sole (*Solēa vulgaris*).

a wholesome and delicious article of food. They sometimes ascend rivers, and seem to thrive quite well in fresh water. The sole sometimes grows to the weight of 6 or 7 lbs. The name is also given in America to certain other flat-fishes. The sole is at its worst from February to the end of March, this being the spawning season. It is usually captured by the trawl-net.

Solemn League and Covenant. See *Covenant*.

Solen. See *Razor-shell*.

Solenhofen, or SOLNHOFEN, a village of Bavaria, near Eichstadt, noted for its famous deposit of limestone of the Upper Oolite age, which, from its fine grain and homogeneous texture, is admirably adapted for lithographic purposes.

Solent, that part of the British Channel separating the north-west shore of the Isle of Wight from the mainland of Hampshire, and extending between the Needles and West Cowes. It has a width varying from 2 to 5 miles, and affords a safe and well-sheltered roadstead. See *Portsmouth*.

Solismes (so-lām), a town of France, department of the Nord, arrondissement of Cambrai, with manufactures of sugar, &c. Pop. 6081.

Soleure (so-leur; German, *Solothurn*), a canton of Switzerland, bounded on the north by Basel-Land; west, south, and south-east by Bern; and east by Aargau; area, 306 square miles. It is traversed throughout by the Jura. The whole canton belongs to the basin of the Rhine, which receives the greater part of its drainage through the Aar. The climate is on the whole remarkably temperate, and not only in the lower grounds but on many of the mountain-slopes nearly all

the ordinary cereals and large quantities of fruit are raised. Immense numbers of cattle, both for feeding and dairy purposes, thrive in the meadows and pastures. Limestone is extensively quarried; and when susceptible of high polish or variegated it is called Soleure marble. The inhabitants are mostly Roman Catholic, and speak German. Education is compulsory. Pop. 100,838.—SOLEURE, the capital, is situated on the south side of the Jura chain, on both sides of the Aar. It is well built; has a cathedral, built in 1762-73; a clock-tower, of Burgundian origin (5th or 6th century); town-house; arsenal, with collection of ancient armour, &c. Pop. 10,116.

Sol-fa System. See *Tonic Sol-fa System*.

Solfatara, the Italian name for volcanic vents found in various parts, which give out sulphureous gases and vapours.

Solfeggio (sol-fej'ō). See *Solmization*.

Solferino, a village and commune of Italy, in the province and 18 miles north-west of Mantua. In 1796 the Austrians were here defeated by the French prior to the siege of Mantua; it was here also, on 24th June, 1859, that a battle was fought between the French and Sardinians on the one side and the Austrians on the other, resulting in the defeat of the latter, and the subsequent treaty of Villafranca. Pop. 1338.

Solicitor, a legal practitioner whose business it is to commence, carry on, or defend suits at law on behalf of persons who employ him, and who usually also carries on conveyancing and other non-contentious business. In England the term was formerly applied distinctively to agents practising before the courts of chancery, attorneys being those who practised in the courts of common law; but by the Judicature Act of 1873 all persons practising before the supreme courts are now called solicitors, and the term attorney is practically obsolete. Solicitors act as advocates for their clients in the inferior courts, but barristers take this duty in the higher courts. (See *Barrister*.) Solicitors have annually to take out a certificate and pay a license duty of £6 (or £9 if practising in London).

Solicitor-general, an officer of the British crown, next in rank to the attorney-general, with whom he is in fact associated in the management of the legal business of the crown, and public offices. The solicitor-general of Scotland is one of the crown-counsel, next in dignity and importance to the lord-advocate.

Solidago. See *Golden-rod*.

Solidification, the conversion of a substance from the liquid to the solid state; this conversion is usually accompanied by the evolution of a considerable amount of heat—latent heat of liquefaction—without any lowering of the temperature of the substance. As a rule, each substance has a fixed temperature at which it solidifies, provided the pressure is constant. This temperature is identical with the melting-point or point of fusion of the substance under the same pressure, provided undercooling is prevented. The temperature remains constant from the moment solidification begins until it is complete, provided the solid and liquid phases of the substance are kept thoroughly mixed. But some substances, such as glass and iron, which become plastic before liquefying, possess no definite point of fusion. Solidification is called *crystallization* when visible crystals are formed. When water solidifies the volume of the resulting ice is about $\frac{1}{4}$ -th larger than that of the water, and hence ice floats on the surface. Cast-iron is larger, at the temperature of the fusing-point, in the solid than in the liquid state; so also are bronze and other metals which give good sharp castings. In many cases, however, a substance contracts in solidifying.

Solidun'gula ('Single-hoofed'), a division of the mammalian order Ungulata, containing the horse, ass, &c.

Sol'idus, a Roman coin originally called aureus. See *Aureus*.

Soliman' II. See *Solyman II.*

Sol'ingen, a town of Prussia, in the Rhine province, with manufactures of iron and steel ware, especially swords; copper and brass ware, cutlery, surgical instruments, &c. Pop. 45,260.

Solis, ANTONIO DE, a Spanish poet and historian, born at Placenza, in Old Castile, in 1610. He is principally known as an historical writer. Having been appointed historiographer of the Indies, he drew up a work entitled *Historia de la Conquista de Mejico*, which passed through many editions, and of which an English translation was published in 1724. Died 1686.

Solitaire, a bird belonging to the dodo family, but having a smaller bill and shorter legs. *Pezophaps solitarius*, the only species of whose existence there is any evidence, is now, like the dodo, extinct, and became so since 1691, when the island of Rodriguez, situated about 300 miles to the east of the

Mauritius, where alone it was found, was first inhabited.

Solitaire, a game played by one person on a board indented with thirty-three or thirty-seven hemispherical hollows, with an equal number of balls. One ball is removed from the board, and the empty hollow thus left enables pieces to be captured singly as in draughts. The object of the player is to take all the pieces except one without moving diagonally or over more than two spaces at a time.

Solmization, in music, an exercise for acquiring the true intonation of the notes of the scale, first by singing them in regular gradation upwards and downwards, and then by skips over shorter or longer intervals. To facilitate this various expedients have been devised, the most popular being the association of the several sounds with certain syllables, such as *ut, re, mi, fa, sol, la*, said to have been first used by Guido of Arezzo in the 11th century—an additional syllable, *si*, for the seventh of the scale, being introduced at a much later date. In the tonic sol-fa method these syllables are thus modified—*doh, ray, me, fah, soh, lah, te*. See *Tonic Sol-fa*.

Solo, a tune, air, or strain to be played by a single instrument or sung by a single voice without or with an accompaniment, which should always be strictly subordinate.

Solomon (Hebrew, *Shelomōh*, the Prince of Peace), son of David, king of Israel, by Bathsheba, formerly the wife of Uriah, was appointed by David to be his successor in preference to his elder brothers. By his remarkable judicial decisions, and his completion of the political institutions of David, Solomon gained the respect and admiration of his people; while by the building of the temple, which gave to the Hebrew worship a magnificence it had not hitherto possessed, he bound the nation still more strongly to his throne. The wealth of Solomon, accumulated by a prudent use of the treasures inherited from his father; by successful commerce; by a careful administration of the royal revenues; and by an increase of taxes,—enabled him to meet the expense of erecting the temple, building palaces, cities, and fortifications, and of supporting the extravagance of a luxurious court. Fortune long seemed to favour this great king; and Israel, in the fulness of its prosperity, scarcely perceived that he was continually becoming more despotic. Contrary to the laws of Moses, he admitted foreign women into his harem; and

from love of them he was weak enough in his old age to permit the free practice of their idolatrous worship, and even to take part in it himself. Towards the close of his reign troubles arose in consequence of these delinquencies, and the growing discontent, coming to a head after his death, resulted in the division of the kingdom, which his feeble son Rehoboam could not prevent. The forty years' reign of Solomon is still celebrated among the Jews, for its splendour and its happy tranquillity, as one of the brightest periods of their history. The writings attributed to Solomon are the Book of Proverbs, Ecclesiastes, and the Song of Solomon, with the apocryphal book the Wisdom of Solomon; but modern criticism has decided that only a portion of the Book of Proverbs can be referred to Solomon.

Solomon Islands, a chain of islands in the Western Pacific, east of British New Guinea. The natives, still in a savage state and cannibals, are principally of Papuan stock. By agreement between Britain and Germany in 1886, modified in 1899, all the islands (notably Choiseul, Isabel, Malaita, Guadalcanar) are under Britain, except Bougainville and Buka, which are assigned to Germany. Area of British islands, 8357 sq. miles, pop. 150,000. Area of German islands, 4200 sq. miles, pop. 45,000. The products include cocoa-nuts, pine-apples, bananas, sandal-wood, and tortoise-shell.

Solomon's Seal, the common name of plants of the genus *Polygonatum*, a genus of liliaceous but not bulbous plants, with axillary cylindrical six-cleft flowers, the stamens

Solomon's Song (called also the **SONG OF SONGS**, or **CANTICLES**), one of the canonical books of the Old Testament. From the earliest period this book has been the subject of voluminous controversies. It seems to have been a recognized part of the Jewish canon in the time of Jesus. Till the beginning of the 19th century the author of the book was almost universally believed to be Solomon. Modern critics, however, attribute it to an author of Northern Israel, who wrote it about the middle of the 10th century B.C., shortly after the death of Solomon, in a spirit of protest against the corrupt splendour of the court of Zion. The unity of the poem is sufficiently evidenced by the continuity of names, characters, and subject, and is taken for granted by the majority of critics. The main subject of dispute has been as to its interpretation. The various theories in regard thereto are too numerous to specify; but they naturally fall into two classes, the literal and allegorical. The highest form of allegorical significance contended for is the mystical or spiritual interpretation, by which the whole poem becomes a figurative representation of the hopes and aspirations, together with the trials and difficulties, of a spiritual life. This interpretation, whether applied individually or collectively to the church or nation of Israel, was almost universally received both by Jews and Christians until recent times. The most favoured literal interpretation is that originally given by Jacobi, that the poem represents the temptation and triumph of virtuous love. The supporters of the allegorical interpretation of the book strongly urge the frequency with which the marriage relation is employed, both in the Old and New Testament, to represent the relation of Jehovah to Israel in the old, and of Christ to the church in the new dispensation.

Solon, one of the seven wise men of Greece, and great legislator of Athens, born about B.C. 640. He was of good family, and acquired a wide knowledge of the world in commerce and travel. One of his earliest public transactions was in stirring the Athenians up to the recovery of Salamis, after which he was chosen chief archon (B.C. 594) and invested with unlimited powers, the state of parties in Athens being such as to threaten a revolution. He established a new constitution, divided the citizens according to their wealth, and added to the powers of the popular assembly. He made many laws relating to trade, commerce, &c. He either



Solomon's Seal (*Polygonatum vulgare*).

inserted in the top of the tube, and the fruit a globose three-celled berry. Species are found in England and Scotland, as well as on the Continent.

entirely abrogated all debts, or so reduced them that they were not burdensome to the debtors; and abolished the law which gave a creditor power to reduce his debtor to slavery. When he had completed his laws he bound the Athenians by oath not to make any changes in his code for ten years. He then left the country, to avoid being obliged to make any alterations in them, and visited Egypt, Cyprus, and other places. Returning after an absence of ten years, he found the state torn by the old party hate; but all parties agreed to submit their demands to his decision. It soon became evident, however, that Pisistratus would succeed in seizing the sovereignty, and Solon left Athens. Though Athens now fell under the despotic rule of Pisistratus, much of Solon's legislation remained effective. He is supposed to have died, in his eightieth year, about B.C. 558.

Solothurn (sol'o-tŭrn). See *Soleure*.

Solstice, in astronomy, the point in the ecliptic at the greatest distance from the equator, at which the sun appears to stop or cease to recede from the equator, either north in summer or south in winter. There are two solstices—the summer solstice, the first degree of Cancer, where the sun is about the 21st of June; and the winter solstice, the first degree of Capricorn, where the sun is about the 22d of December. The time at which the sun is at either of these points also receives the same name.

Solution, the name given to the conversion of a gas and liquid or of a solid and liquid into a homogeneous liquid. It may also be applied to the conversion of two liquids into a homogeneous liquid, e.g. the solution of oil of vitriol in water. Ammonia and water form a homogeneous liquid. Common salt and water, sugar and water, silver and mercury, rosin and oil of turpentine yield homogeneous liquids. In the above cases the liquid is usually termed the *solvent*, the gas or solid the *solute*, and the resulting product the *solution*. Every liquid will dissolve every gas, solid, or other liquid to a certain extent, but in many cases the amount dissolved is so excessively minute that the substance is said to be insoluble, e.g. mercury in water. When the solution contains as much of the solute as it normally can at the given temperature and pressure it is termed *saturated*, and if less, *unsaturated*. In certain cases *supersaturated* solutions may be prepared, but these are extremely unstable, and

readily deposit the excess of solute when stirred. A given solvent can dissolve different amounts of different solids, and the solubility is usually expressed in number of parts by weight of the solid which dissolve in 100 parts by weight of the solvent at a given temperature. The solubilities of common salt, nitre, and Glauber's salt in water at the ordinary temperature are respectively 37, 52, and 15. As a rule the solubility increases with the temperature, but a few substances, like lime and gypsum, are less soluble in hot water than in cold. Gases are also less soluble in hot than in cold liquids.

Solway Firth, an arm of the Irish Sea, forming part of the boundary between England and Scotland, and extending inland in a north-eastern direction for above 41 miles, with a breadth diminishing from 20 miles, at its entrance between St. Bees Head in Cumberland, and Balcarry Point in Kirkcudbrightshire, to 7 miles, and finally only to 2 miles. A large portion of the Solway is left dry at ebb-tide. It abounds with fish, and has several valuable salmon-fisheries.

Solway Moss, a tract of mossland, about 7 miles in circumference, in the N. of Cumberland, w. of Longtown; the scene of a battle between the English and the Scotch in 1542, when the latter were defeated.

Solyman, or SULEIMAN II., surnamed the *Magnificent*, Sultan of Turkey, was the only son of Selim I., whom he succeeded in 1520. Having put down a revolt which occurred in Syria and Egypt, and concluded an armistice with Persia, he besieged and took Belgrade in 1521. The next year he captured the island of Rhodes, which had been in the possession of the knights of St. John for 212 years. Turning his arms now against Hungary, he gained the battle of Mohács, and captured Buda and Pest. In 1529 he advanced on Vienna, but was forced to raise the siege with great loss. His armies next gained considerable territories from Persia. In 1541 he overran a great part of Hungary, but an armistice was concluded for five years in 1547, though war was renewed in 1551. In 1565 he attempted the capture of Malta in vain. Next year he died at the siege of Szigeth, in Hungary, in the seventy-sixth year of his age. See *Ottoman Empire*.

Soma, a plant belonging to the natural order Asclepiadaceæ, the *Asclepias acida*; also an intoxicating drink obtained, it is supposed, from the plant, which the ancient Aryans believed was pleasing to the gods as a sacrifice. They went so far in their

adoration of soma that they personified it as one of their highest gods.

Somaj. See *Brahmo-somaj*.

Somaliland, a country of Eastern Africa, forming the 'eastern horn' of the continent, bounded on the north by the Gulf of Aden, and on the east by the Indian Ocean from Cape Guardafui to the equator and the river Jub. The country is greatly diversified by mountain, hill, and valley, fertile tract and desert, but is on the whole characterized by dryness and want of permanent streams. Several species of gum-trees occur, and the mimosa, tamarisk, wild fig, and several species of the cactus and aloe are abundant. The Somali are a fine race, mainly Mohammedans. The principal articles of trade or produce are myrrh, ivory, ostrich-feathers, hides and horns, coffee, indigo, and gum-arabic. The British Somaliland Protectorate, including the ports of Berber, Bulhar, and Zeila, has an area of 60,000 sq. miles, and a population of 800,000. The area of Italian Somaliland is 100,000 sq. miles, and the pop. 400,000. The French Somali Coast Protectorate, with the port of Jibuti as capital, has an area of 12,000 sq. miles, and a pop. of 50,000. There is a railway inland from Jibuti to Abyssinia. The rest of Somaliland belongs to Abyssinia. There have been several British expeditions in recent years against a Somali leader called the Mad Mullah.

Sombrerete (-rā'tā), a town of Mexico, about 80 miles north-west of Zacatecas, and in the state of that name, with rich mines of silver. Pop. 10,000.

Sombre'ro Island, a small rocky British island midway between Anguilla and the Virgin group, West Indies. It has a lighthouse, and there were deposits of phosphate of lime, now worked out.

Somers, JOHN, LORD, an English lawyer and statesman, born near Worcester in 1651, who took a prominent part in the opposition to the tyrannical measures of Charles II. and James II., and acquired great credit for his share in the defence of the seven bishops. He was chairman of the committee which framed the Declaration of Rights, and sat in the Convention Parliament. After filling many legal offices, he became lord chancellor in 1697, with the title Lord Somers, Baron Evesham. Although so sturdy a Whig, Lord Somers won the esteem of many of the Tory party by his high character, his great ability, his consistency and courage, and his unfailing courtesy. After

the death of William III. he withdrew into retirement, but was recalled by Anne, who made him president of the council. He fell



Lord Somers.

again with the Whigs in 1710. Science and letters found a warm patron in Lord Somers, who was one of the first to recognize Addison's ability. He died in 1716.

Somerset, a county of England, bounded by the Bristol Channel and by Gloucestershire, Wiltshire, Dorsetshire, and Devonshire; area, 1,038,017 acres, nearly nine-tenths of which are under cultivation. Part of the coast is low and marshy, and part lined with lofty slate cliffs. The interior is intersected by several ranges of hills, including the Mendip Hills, which in some parts exceed 1000 feet in height, and the Quantock Hills, occupying the west part of the county, attaining a height of 1262 feet. In the north-east the prevailing strata belong to the Oolite formation, and contain the quarries which furnish the famous Bath stone; in the east and south-east magnesian limestone is largely developed; while on the north-east side of the Mendip Hills are three small isolated coal-fields. In the west Old Red Sandstone is the prevailing formation, and forms the wild moorlands of Exmoor Forest. The chief minerals are coal and limestone. The principal rivers are the Avon and Parret. Cattle of excellent quality are raised; sheep are pastured on the uplands; and there is a large orchard area. The manufactures are mostly woollen and worsted goods, gloves, silk, linen, crape, and lace. The county contains the cities of Bath and Wells, part of the city of Bristol, and the municipal boroughs of Bridgwater, Chard, Glastonbury, Taunton, and Yeovil. It is divided into seven parl. divisions. Pop. 508,256.

Somerset, DUKE OF. See *Seymour*.

Somerset, ROBERT CARR, EARL OF, a favourite of James I., born in Scotland in 1589, died 1645. He was at first a page to James, and followed him to England when he succeeded Elizabeth in 1603. The king became greatly attached to him, made him treasurer of Scotland, and gave him a seat in the upper house with the title of Viscount Rochester, and then of Earl of Somerset. In the height of his greatness he married the divorced wife (with whom he had previously had an improper intimacy) of the young Earl of Essex, contrary to the advice of his friend and secretary, Sir Thomas Overbury. The countess never forgave Overbury for this; and on her suggestion he was sent to the Tower for some trivial offence, and after a few months despatched by poison. The murder was discovered, and all the parties to it were condemned. The tools in the crime were executed, but Somerset and his wife were kept in the Tower. After a few years' imprisonment the unhappy pair obtained their freedom and spent the rest of their days in obscurity and disgrace.

Somerset House, Strand, London, stands on the site of a palace commenced by the Protector Somerset, which, after being the residence of several royal personages, made way for the present buildings. It contains the offices of the registrar-general of births, deaths, and marriages, the exchequer and audit departments, the inland revenue, and the probate and divorce registries of the High Court of Justice.

Somers Islands. See *Bermudas Islands*.

Somerville, a city of the U. States, in Massachusetts, 2 miles from Boston, of which it may be regarded as a suburb. Pop. 61,643. See *Boston*.

Somerville, MARY, writer on the physical sciences, born at Jedburgh in 1780, died at Naples 1872. She was the daughter of Admiral Fairfax, and was to a great extent self-educated, but acquired a respectable knowledge of Greek and Latin. It was only, however, when she became acquainted with mathematics that she discovered the true bent of her genius, and in this study she made rapid progress. Married to Samuel Greig, consul for Russia, in 1804, she had only three years of wedded life, when her husband died. In 1812 she married her cousin, William Somerville, son of the minister of Jedburgh, with whom she settled in Edinburgh, until in 1816, when they went to reside in London. At the request of Lord Brougham, and with the object of populariz-

ing Laplace's *Mécanique Céleste* for the Society for the Diffusion of Useful Knowledge, she, in 1827, prepared her first work, *Mechanism of the Heavens*. It proved above the class for whom it was intended, and was published independently in 1831. This work brought her many honours, including the honorary membership of the Royal Astronomical and other learned societies, and a pension from government. She wrote a preface to this work on the relation of the sciences, which was afterwards expanded into a separate work—*The Connection of the Physical Sciences* (1834). This work was translated into the principal European languages. Soon after the publication of the latter work, Mrs. Somerville removed with her family to Italy, where she resided successively at Florence, Rome, and Naples, making the last her permanent residence after the death of her husband. Here she occupied herself with the preparation of a general work on physical geography, which was published in 1848, and enjoyed great popularity. In 1869 she published a new work on *Molecular and Microscopic Science*.

Somerville, WILLIAM, an English poet, born in 1675, and educated at Oxford. His chief work, a didactic poem in blank verse, entitled *The Chace*, was published in 1735. His other works, *Hobbinol* and *Field Sports*, are inferior to the first named, and are now little read. Died 1742.

Somme, a department of France, bounded on the north-west by the English Channel, with an area of 2379 square miles. It is drained chiefly by the river to which it owes its name. The greater part of the department belongs to the upper chalk formation, and in general appearance is one of the least picturesque districts of France. It has a soil not naturally fertile, but improved by cultivation; and cider and poultry are notable products. The manufactures, especially textiles, are very important. The capital is Amiens. Pop. 537,848.

Somme, a river of France, which rises in the department of Aisne, 7 miles north-east of St. Quentin; flows south-west into the department of the Somme, and falls into the English Channel about 15 miles beyond Abbeville; length, 150 miles.

Somnambulism, a peculiar perversion of the mental functions during sleep, in which the subject acts automatically. The organs of sense remain torpid and the intellectual powers are blunted. During this condition some instinctive excitation may take place,

and there may be the production of impulses, in consequence, of different kinds. Walking in sleep is the most palpable, but not the most marvellous characteristic of this condition. The person affected may perform many voluntary actions implying to all appearance a certain degree of perception of the presence of external objects. The somnambulist gets out of bed, often dresses himself, goes out of doors, and walks frequently over very dangerous places in safety. On awaking in the morning he is either utterly unconscious of having stirred during the night, or remembers it as a mere dream. Sometimes the transactions of the somnambulist are carried much further; he will mount his horse and ride, or go to his usual occupation. In some cases somnambulists are capable of holding conversation. Somnambulism occurs in the sensitive and excitable, often in conjunction with other nervous affections, and is hereditary. Artificial somnambulism is induced by hypnotism, and the consciousness is for the time entirely absorbed by one set of ideas.

Somnath (som-nāt'), a town of India, Bombay Presidency, Gujerat, on the coast of the Peninsula of Kattywar. It is in the form of an irregular quadrangle, inclosed on all sides except the west, where the sea washes it, by a ditch and a wall of great strength and solidity. The space inclosed is far too large for the present inhabitants (8644), who live amid splendid ruins, telling of a grandeur which has long since passed away. The great temple, now in ruins, to which the place was mainly indebted for its celebrity, stands on an eminence north-west of the town, and so completely overtops all the other buildings that it can be seen at the distance of 25 miles.

Somnus (Latin, 'sleep'), or **HYPNOS** (Greek), in ancient mythology, the god of sleep, son of Nox (night) and twin brother of Mors (Death).

Sona'ta, in music, a term originally applied to any kind of composition for instruments, in contradistinction to vocal compositions, which were called *cantatas*. The name was subsequently, however, restricted to compositions for solo instruments (generally the pianoforte). Sonatas are of a certain form, consisting of several movements—at first three, the allegro, adagio, and rondo, to which afterwards a fourth was added, the minuetto or scherzo—which differ from each other in time and sentiment, but are held together by their general character.

Sonchus. See *Sow-thistle*.

Sonderburg, a town of Prussia, in Schleswig-Holstein, on the island of Alsens. Pop. 5522.

Sondershausen, a town of Germany, capital of Schwarzburg-Sondershausen, on the Wipper, 34 miles N.N.W. of Weimar. It has the residence of the prince, a conservatory of music, &c. Pop. 7054.

Son'drio, a town of N. Italy, capital of prov. of same name, on the Malero, near its junction with the Adda, amid fine alpine scenery; a tourist centre, with considerable trade. Pop. 5000.—The prov. borders on the Grisons and Tyrol, and mainly consists of the Valtellina or Adda valley; area, 1257 sq. miles. Pop. 126,000.

Song, a little poem intended to be sung; a lyric. The term is applied to either a short poetical or musical composition, but most frequently to both in union. As a poetical composition a song may be defined as a short poem divided into portions of returning measure, and turning upon some single thought or feeling. As a union of poetry and music, it may be defined as a brief lyrical poem, founded commonly upon agreeable subjects, to which is added a melody for the purpose of singing it. As denoting a musical composition, it is generally confined to an air for a single voice—airs for more than one voice being, however, sometimes called part-songs.

Song-ka. See *Red River*.

Sonneberg (zon'ne-berk), a town of Germany, in the Duchy of Saxe-Meiningen, on the Röthen. Its chief industry is connected with the manufacture of toys, chiefly dolls, of wood or papier-maché, which go to all parts of the world, but especially to Britain and America. Pop. 13,317.

Sonnenburg, a town of Prussia, district of Frankfurt, with silk weaving and other industries. Pop. 5261.

Sonnet (Italian, *sonetto*), a species of poetical composition consisting of fourteen rhymed verses, ranged according to rule. It is of Italian origin, and consists of two stanzas of four verses each, called the *octave*, and two of three each, called the *sestette*. The *octave* of the proper sonnet consists of two quatrains, the rhymes of which are restricted to two—one for the first, fourth, fifth, and eighth lines; the other for the second, third, sixth, and seventh. In the *sestette*, which is commonly made up of two tercets, the rhymes may be two or three, variously distributed. This is the Petrarchan or Italian form, but the verses may

also be arranged in the Shaksperian form of three quatrains of alternate rhymes clinched by a couplet, or in the irregular form practised by Coleridge and others. The sonnet generally consists of one principal idea, pursued through the various antitheses of the different strophes. The lightness and richness of the Italian, Spanish, and Portuguese languages enable their poets to express every feeling or fancy in the sonnet; but in English it has been found most suitable to grave, dignified, and contemplative subjects. Among the most successful writers of English sonnets are Shakspeare, Milton, Drummond of Hawthornden, Wordsworth, Keats, Mrs. Browning, and Rossetti.

Sonom'eter, an apparatus for illustrating the phenomena exhibited by sonorous bodies, and the ratios of their vibrations, by the transverse vibrations of tense strings or wires. Also an apparatus for testing metals by bringing them in contact with an induction coil, with which is associated a telephone and microphone. Each metal, acting differently on the coil, produces a different sound.

Sono'ra, one of the states of Mexico, lying on the Gulf of California, on which it has several good ports. It is generally hilly, and abounds in mineral wealth. Gold is found in washings and mines, and the silver-mines are rich and numerous. Corn, maize, beans, pease, tobacco, and the sugar-cane are largely cultivated. Guaymas is the principal port, and has a splendid harbour. The capital is Hermosillo. Pop. 220,553; area, 79,021 square miles.

Sonsona'te, a town of San Salvador, Central America, about 50 miles w.s.w. of San Salvador, with a trade in sugar and shell-work. Pop. 10,000.

Sontag, HENRIETTE, a celebrated operatic singer, born at Coblenz in 1805. She appeared with brilliant success in all the capitals of Europe, where she was recognized as a worthy rival of Malibran. In 1829 she married Count Rossi, an Italian nobleman, and in the following year retired from the stage. Twenty years later, however, in consequence of loss of fortune, she was obliged to return to the stage, when it was found that her voice had lost none of its power or charm. She died of cholera in Mexico in 1854.

Soo-chow-foo, a town of China, in the province of Kiangsoo, on a lake in the line of the Imperial Canal, 125 miles south-east of Nankin. It consists of the town proper, with walls 10 miles in circuit; is intersected

by numerous canals; and is celebrated for the splendour of its edifices, the beauty of its gardens, the excellence of its manufactures, and the extent of its trade. It was opened to foreign trade in 1895. Pop. above 500,000.

Soodras (*Sádras*), the lowest of the four great castes of India—Brahmans, Kshatriyas, Vaisyas, Soodras. They are chiefly farmers, gardeners, artisans, and labourers of every kind.

Sooloo. See *Sulu*.

Sooran'jee, or MORINDIN, a drug used for dyeing, prepared from the root of the *Morinda citrifolia*. See *Morinda*.

Soosoo, a cetaceous mammal, the *Platanista gangeticus*, which resembles the dolphin in form, and attains the length of about 12 feet. It inhabits the Ganges; is most abundant in the sluggish waters of its delta, but is found also as far up the river as it is navigable. It is closely allied to fresh-water dolphins of the S. American rivers.

Soot, a black substance formed when almost any form of fuel is burnt with incomplete combustion. It consists of fine black particles of carbon and carbon compounds, and is deposited on the sides of the chimney or pipe conveying the smoke. The soot of coal and of wood differ materially in composition, the former containing more carbonaceous matter than the latter. Coal-soot contains ammonium chloride and sulphate, and has been used for the preparation of the carbonate. It contains likewise an empyreumatic oil; but its chief basis is charcoal, in a state in which it is capable of being rendered soluble by the action of oxygen and moisture; and hence, combined with the action of the ammoniacal salts, it is used as a manure, and acts very powerfully as such. The soot of wood has been minutely analysed, and found to consist of fifteen different substances, of which ulmin, nitrogenous matter, calcium carbonate, water, calcium acetate and sulphate, potassium acetate, and carbonaceous matter insoluble in alkalis, are the principal.

Sophia. See *Sofia*.

Sophi'a, CHURCH OF ST., in Constantinople, the most celebrated ecclesiastical edifice of the Greek Church, now used as a mosque, was built by the emperor Justinian, and dedicated in 558. It is in the Byzantine style of architecture, has a fine dome rising to the height of 180 feet, and is richly decorated in the interior. With the principal dome are connected two half domes and

six smaller ones, which add to the general effect. The mass of the edifice is of brick, but is overlaid with marble; the floor is of mosaic work, composed of porphyry and verd antique. The great piers which support the dome consist of square blocks of stone bound with hoops of iron. The numerous pillars supporting the internal galleries, &c., are of white and coloured marbles, porphyry, granite, &c., and have capitals of various peculiar forms. The interior of the church is 243 feet in width from north to south, and 269 in length from east to west, and its general effect is singularly fine.

Sophists, the name of a school or congeries of schools of philosophical teachers or 'thinkers,' who appeared in Greece in the period immediately preceding and contemporary with Socrates in the latter part of the 5th century B.C. It was a period of political decline and social corruption, and the sophists were men who, although often able and sometimes well meaning, were not strong enough to rise above the unwholesome influences under which they were placed. Their philosophy (if it can be called so) was one of criticism of those that had gone before; there was nothing creative in it, nothing even formative. The tendency of the teaching of the sophists was mainly sceptical as regards previous philosophical speculation; and while the chief point of convergence of their teaching was in an ethical direction, the influence of their ethical teaching was mostly mischievous. But the sophists rendered considerable service to science and literature, and even indirectly to philosophy. They belonged to all the liberal professions; they taught all the usual branches of knowledge. Some of them were distinguished as rhetoricians and grammarians, others as men of science. Rhetoric, to which they gave undue importance, was systematically studied by them, and they supplied some of the earliest models of good Greek prose. They are accused, however, particularly the later sophists, of being not only superficial in their attainments, but mercenary, vainglorious, and self-seeking in their aims.

Sophocles (-klēz), the second in order of time of the three great Greek tragic dramatists, was born at Colonos, a village in the immediate vicinity of Athens, in the second year of the seventy-first olympiad, B.C. 495. The rank of his family is not known, but he received an education equal to that enjoyed by the sons of the best Athenian fami-

lies. Sophocles first appeared as a dramatist in B.C. 468, when he took the first prize in competition with Æschylus. Æschylus retired to Sicily, and only returned to enter again for a brief period into the lists with Sophocles. Sophocles accordingly held all but undisputed supremacy until the appearance of Euripides, who took the first prize in 441. Sophocles, however, excelled both

his rivals in the number of his triumphs. He took the first prize some twenty-four times, the second frequently, the third never. In B.C. 440 he was chosen one of the ten generals in the war against the aristocratic party of Samos. In his old age he suffered from family dissension.

His son, Iophon, jealous of the favour he showed to his grandson Sophocles, and fearing he himself should suffer from it in the disposition of his property, summoned him before the judges, and charged him with being incompetent to manage his affairs. In reply Sophocles read a part of the chorus of his *Edipus at Colonos*, which he had just composed, and at once proved that his faculties were unimpaired. He died about the age of ninety. One hundred and thirty plays in all are ascribed to him, of which seventeen are supposed to be spurious. Eighty-one of his dramas, including the seven now extant, were brought out after he had attained the age of fifty-five. The chronological order of the existing plays is given as follows: *Antigone*, *Electra*, *Trachiniæ*, *Edipus Tyrannus*, *Ajax*, *Philoctetes*, *Edipus at Colonos*. Sophocles brought the Greek drama to the highest point of perfection of which that form of art is susceptible. His subjects are human, while those of Æschylus are heroic, and in his management he shows himself a perfect master of human passions. The tendency of his plays is ethical, and he subordinates the display of passions to an end. He also introduced scenic illustration and a third actor. (See *Drama*.) No tragic poet in ancient or modern days has written with so much elevation and



Sophocles, from ancient bust.

purity of style. The versification of Sophocles stands alone in dignity and elegance, and his iambs are acknowledged to be the purest and most regular. One of the best English translations of Sophocles is that by E. H. Plumptre.

Sophonisba. See *Masimissa*.

Sophora, a genus of plants, nat. order Leguminosæ. The species are ornamental shrubs and trees, found chiefly in central and tropical Asia, and the tropical and subtropical parts of South America. They have pinnate leaves, and terminal racemes or panicles of whitish flowers. The species best known in England are *S. japonica* and *S. chinensis*.

Soprano, the highest register of female voices. Its ordinary range is from C below the treble staff to A above it, though some sopranos may go as high as E. The mezzo-soprano register is from A to F, that is, a third lower than the soprano.

Sora, a town of Sicily, prov. Caserta, on the Garigliano, see of a bishop. Pop. 6000.

Soracte, a celebrated mountain of Italy, 27 miles north of Rome, now called Monte Sant' Oreste; height, 2420 feet.

Sorata, or ILLAMPU, one of the highest of the Andes, a volcanic cone in Bolivia, on the east side of Lake Titicaca; height, 21,484 feet.

Sorau (Sōrou), a town of Prussia, in the province of Brandenburg, 50 miles s.e. of Frankfurt. It has a church dating from about 1200, a castle of 1207, manufactures of woollen and linen cloth, dye-works, &c. Pop. 15,945.

Sorb-apple, the fruit of the service-tree. See *Service-tree*.

Sorbine, SORBINOSE, a crystalline unfermented sugar ($C_6H_{12}O_6$), isomeric with grape and fruit sugar. It exists in the ripe juice of the mountain-ash berries (*Pyrus Aucuparia*).

Sorbonne, a theological institution founded in connection with the University of Paris in 1252 by Robert de Sorbon, chaplain and confessor of Louis IX. It exercised a high influence in theological and ecclesiastical affairs from the 14th to the 17th centuries, but was suppressed during the first revolution. At the reconstruction of the university in 1808 the building erected for it by Richelieu was given to the theological faculty in connection with the faculties of science and belles-lettres; and the Sorbonne is still a centre of university education.

Sorb-tree. See *Service-tree*.

Sorel, a town and river port of the dominion of Canada, in the province of Quebec, on Lake St. Peter, at the mouth of the river Richelieu, with some manufactures and a considerable trade. It has docks, barracks, an arsenal, R. Catholic college, convent, &c. Pop. 7057.

Sorel, AGNES, mistress of Charles VII. of France, born in Touraine 1409, died at Jumièges 1450. She acquired great influence over the king, and was the means of rousing him from his habitual sloth to resist the English invaders.

Soresina, a town of Northern Italy, in the province of Cremona, and 14 miles north of the town of that name, between the Oglio and the Adda. Its chief industries are the vine and silk culture. Pop. 8000.

Sorgho (sorgo), a species of grass, the *Holcus* or *Sorghum saccharatum*.

Sorghum, a genus of grasses, some species of which are known by the general name of millet. They are tall grasses with succulent stems, and are found in the tropical parts of Asia, whence they have spread to other warm regions. *S. vulgare* is the largest of the small cereal grains, and is called Guinea-corn and Indian millet. The different kinds are called jowar in India, where many of the inhabitants live upon these small dry grains, as upon rice. It is the dhurra and Kaffir corn of Africa. *Sorghum* has been introduced into the south of Europe, where it is chiefly used for feeding cattle and poultry, but it is also made into cakes.

Soria, a town of North-eastern Spain, capital of the province of that name, on the Douro. Pop. 7300.—The province of Soria has an area of 3983 sq. miles, and a pop. of 150,462.

Soricidae, a family of insectivorous mammals, comprehending the shrews, shrew-mice, musk-rats, &c.

Soroki, a town of Russia, gov. Bessarabia, on the Dniester. Pop. 16,000.

Sorrel (*Rumex acetosa*), a plant belonging to the natural order Polygonaceæ. The leaves have an acid taste, and have long been used in salads. The stems are upright, 1½ or 2 feet high, provided with a few arrow-shaped leaves on the inferior part of the



Sorghum vulgare
(Indian millet).

stem, and lanceolate ones above. The sheep's sorrel (*R. acetosella*) is less than the preceding, but resembles it in habit. Wood-sorrel is of the genus *Oxalis*.

Sorrel-tree (*Oxydendrum arboreum*), a tree belonging to the natural order Ericaceæ. It inhabits the range of the Alleghanies from Virginia to Georgia. The leaves are 4 or 5 inches long, oval-acuminate, finely toothed, and strongly acid in taste. The flowers are small, white, and disposed in long one-sided racemes, clustered in an open panicle.

Sorren'to, a seaport of Italy, on the south side of the gulf and 17 miles S.E. of the city of Naples. It is delightfully situated, is surrounded by decayed walls, and has a cathedral and various other churches. It has manufactures of silk, and is frequented for sea-bathing, and as a delightful place of residence in summer. Pop. 7000.

Sortes Biblicæ, SORTES VIRGILIANÆ. See *Bibliomancy*.

Sortie, the issuing of a body of troops from a besieged place to attack the besiegers.

Sotteville-les-Rouen (sot-vêl-lâ-rö-an), a town of France, on the Seine opposite Rouen, with manufactures of soap, glue, chemical products; railway works, and several spinning-mills. Pop. 18,535.

Souari-nut (sô-â-rê), the fruit of *Caryocarp nucifèrum*, a native of British Guiana. It is spherical in form, of a reddish-brown colour, and measures 5 to 6 inches in diameter. It contains four or fewer seeds embedded in a white pulp. They contain a nutty, oily kernel, which is pleasant to eat, and is imported into Britain under the name of butter-nuts (which see).

Soubise (sô-bêz), BENJAMIN DE ROHAN, SEIGNEUR DE, famous Huguenot captain, born at Rochelle 1583, was the son of René de Rohan, and brother of the famous Henri de Rohan, chief of the Protestant party under Louis XIV. He learned the trade of arms under Maurice of Orange; and when the religious wars again broke out in 1621 he was intrusted with the chief command in Brittany, Anjou, and Poitou. He conducted the war with much spirit, but was eventually obliged to seek refuge in England. In 1625 he made a dashing attack upon the royalist fleet in the river Blavet, seized a number of vessels, and captured the islands of Oleron and Ré. He was active at Rochelle during the famous siege in 1627 and 1628, and when the town was captured he

retired once more to England, where he died in 1642.

Soudan', or **SUDAN'**, is the Arab name given to the vast extent of country in Central Africa which lies between the Sahara on the N., Abyssinia and the Red Sea on the E., the countries draining to the Congo basin on the S., and Senegambia on the W. Its area is estimated at 2,000,000 sq. m., and its pop. at from 7 or 8 to 30 millions. The inhabitants comprise numerous nations of different races, chiefly the Negro, together with Arab colonists and traders. The Western and Central Soudan are divided into a number of more or less independent states under British, French, or German influence, as Gando, Sokoto, Bornu, Baghirmi, Wadai, &c. The Eastern Soudan includes Darfur, Kordofan, &c. Egyptian rule was first extended to the Eastern Soudan in the early part of the 19th century by Mohammed Ali, under whom Ibrahim Pasha carried it as far south as Kordofan and Senaar. An Egyptian expedition under Sir Samuel Baker in 1870 led to the conquest of the equatorial regions on the Nile farther south than the Soudan proper, of which General Gordon was appointed governor-general in 1874. On the fall of Ismail Pasha of Egypt Gordon was recalled, and hordes of Turks, Circassians, and Bashi-Bazouks were let loose to plunder the Soudanese. Egyptian misrule then became intolerable, and in this crisis appeared Mohammed Ahmed of Dongola, who gave himself out to be the Mahdi, the long-expected redeemer of Islam. (See *Egypt*, and *Gordon*, *Charles George*.) Emin Pasha (Eduard Schnitzer) was appointed governor of the Equatorial Province on the Upper Nile, north of the Albert Nyanza, by Gordon in 1878, and he continued to hold his ground here till 1889, when he was relieved by Henry M. Stanley, and conveyed with his followers to Zanzibar. The Eastern Soudan was wrested from the Mahdi's successor in 1898, and is now under Anglo-Egyptian rule.

Soufflé (sô-flâ), a light dish composed of white of eggs, flavoured with chocolate, vanilla, orange-flower, &c., and baked.

Soul, the rational and spiritual part in man which distinguishes him from the brutes, the indwelling spirit of man, which is both immaterial and immortal. Soul is sometimes used as synonymous with *mind*, but generally it is used in a wider sense as being a whole to which pertain the faculties that constitute mind. Soul and *spirit* are more nearly

synonymous, but each is used in connections in which it would be improper to use the others. Nearly all philosophies agree in regarding the soul as that part of man which enables him to think and reason, and which renders him a subject of moral government; but they differ when it comes to a question of origin and detail. Many philosophers maintain the indestructibility as well as the immateriality of the soul; but a whole host of others, both in ancient and modern times, have assigned a material basis to consciousness, and all that we regard as belonging to the soul. Modern materialists usually make the soul, or what others regard as such, merely a result of organism. A common set of arguments regarding the soul are as follows:—We know that the soul, as an individual intelligence, has had an origin, for it originated with the beginning of our organized life. We know that it was not self-originated, for nothing could originate in that which had no previous existence. We know that it could not have originated in any thing or any number of things without intelligence, for intelligence cannot spring from non-intelligence, which is its contradictory. We know that our soul is related to a bodily organism, which it is capable in many ways of controlling, and through which it is related to the entire physical universe; that in that universe it discovers a uniformity of laws through which it exercises an indefinite control over physical objects, extending in some measure to all with which it comes into communication. We know, therefore, that this universe is under the control of the Intelligence in whom our soul originated; in other words, that there is one Supreme Being, who is the author of all the harmony of being with which we are by our own participation in it made partially acquainted. We are thus also enabled to return a definite answer to the question as to the immortality of the soul. If the soul has had an intelligent originator it is evident we can know nothing as to its duration without knowing the design or will of its originator. Psychology, therefore, furnishes the conditions of the problem of immortality, but does not answer it; it refers it to the higher science of theology. The end of philosophy is thus religion. If it does not end here it leads inevitably into scepticism. It is, then, to the views of God supplied either by natural or revealed religion that we must look for light upon the question of the soul and the soul's immortality, and it was from

this source that the best and surest arguments of such men as Socrates and Plato were drawn.

Sōul (sé-ul'), capital of Corea, about 27 miles from the sea, not far from the right bank of the Han River, a tributary of the Yellow Sea. The city proper is surrounded by walls, has narrow and dirty streets, and houses generally low and mean. The royal palace and its grounds occupy a great area, and are surrounded by a lofty wall. Silk, paper, fans, mats, &c., are manufactured. Pop. 150,000, or with suburbs 300,000.

Souls, CURE OF, is an ecclesiastical charge in which parochial duties and the administration of sacraments are included. In the Church of England the cure of souls in each diocese is primarily vested in the bishop, the clergy of each parish acting as his deputies.

Soult (sült), NICOLAS JEAN DE DIEU, Duke of Dalmatia and Marshal of France, was born of humble parentage at Saint Amans la Bastide, in the department of Tarn, in 1769, and in 1785 entered an infantry regiment as a common soldier. Raised from the ranks, he became successively lieutenant and captain in his regiment. At that time he served on the Upper Rhine, and greatly distinguishing himself at Kaiserslautern, Weissenburg, Fleurus, and other places, and after successive promotions was named general of division by Masséna, to whose army he was attached. In the unsuccessful campaign in Italy he was wounded and taken prisoner, but obtained his liberty after the victory of Marengo, in 1800. In 1808 he had the command of one of the three camps of the army intended against England, that at St. Omer. He was one of the marshals created immediately after the formation of the empire in 1804; and in the Austrian war in 1805 distinguished himself at Ulm and Austerlitz. He acquired new fame in the Prussian campaign; and in 1807, after the battle of Friedland, took Königsberg. From 1808–12 he fought in Spain, but, overmatched by Wellington, was unable to gain many laurels. In 1813 he was recalled in consequence of Napoleon's disasters, to take the command of the fourth corps of the grand army, and commanded the infantry of the guard at Lützen. On the news of Wellington's victory at Vittoria he was sent back to reorganize the French force in Spain, and did his utmost to oppose Wellington's triumphant career till Napoleon's abdication. Soult gave in his adhesion to Louis XVIII., who appointed him commander of the thirteenth

military division; and in 1814 made him minister of war. On Napoleon's return he joined his standard, and held the post of major-general of the army in the campaign of Waterloo. After the second restoration



Marshal Soult.

he took up his residence at Düsseldorf, but was permitted to return to France in 1819; and in 1827 was raised to the peerage. After the July revolution of 1830, and on two subsequent occasions, he held ministerial office, and in 1846, on retiring from public life, was created Grand-marshal of France. He died in 1851.

Soumy (sŏ'mi), a town of Russia, in the government of Kharkov, with a large trade in spirits and agricultural produce, and four large annual fairs. Pop. 15,831.

Sound. See *Acoustics* and *Ear*.

Sound, THE, a strait which connects the Kattegat with the Baltic, and separates the Danish Island of Seeland from Sweden. Its length, nearly due north and south, is 66 miles, and its greatest breadth, measured from Copenhagen eastward, is 17 miles. The name Sound, however, is more properly applied to the narrow part of the passage, which, between Elsinore and Helsingborg, has a width of only 3 miles. Formerly by almost immemorial custom, sanctioned by treaties, and finally confirmed by the Congress of Vienna in 1815, all merchant vessels passing the Sound had to pay duty to Denmark at Elsinore. But in 1857 the duties were abolished by treaty, the British paying one-third of the indemnity. See *Elsinore*.

Sounding, the operation of trying the depth of water and the quality of the bot-

tom, especially by means of a plummet sunk from a ship. In navigation two plummets are used, one called the *hand lead*, weighing about 8 or 9 lbs.; and the other, the *deep-sea lead*, weighing from 25 to 30 lbs. (See *Lead*.) The former is used in shallow waters, and the latter at a distance from shore. The nature of the bottom is commonly ascertained by using a piece of tallow stuck upon the base of the deep-sea lead, and thus bringing up sand, shells, ooze, &c., which adhere to it. The scientific investigation of the ocean and its bottom has rendered more perfect sounding apparatus necessary, and has led to the invention of various contrivances for this purpose, among the most simple and common of which is Brooke's sounding apparatus. Some of the deepest sea-soundings yet obtained that can be relied on have been obtained by H.M.S. *Challenger*. See *Ocean*.

Soup, a decoction of flesh in water, properly seasoned with salt, spices, &c., and flavoured with vegetables and various other ingredients. There are very many kinds of soup, the introduction of a different ingredient furnishing the occasion for a distinctive name, but they may all be divided into two classes—clear soup and thick soup. *Maigre* soup is a soup made without meat.

Sourabaya (sŏ-rä-bä'yä), a seaport of Java, capital of a province of the same name, on the Strait of Madura. It possesses a large and secure harbour; a building-yard, graving dock, and an extensive trade in exports of native produce, and imports of European manufactures. Pop. 147,000.

Sourakarta, or **SOLO**, a town of Java, capital of the province of the same name, 140 miles w.s.w. of Sourabaya. It has manufactures of cotton and other tissues, leather, &c. Pop. 50,000.

Sour-gum. See *Tupelo*.

Sour-sop. See *Anona*.

Sousdal, or **SUSDAL**, a town of Russia, in the government of Vladimir, in a fertile plain on the Kamanka. Pop. 8000.

Souslik. See *Suslik*.

Soutane (sŏ-tän), the common outer garment worn by the clergy in the Roman Catholic Church. See *Cassock*.

South, ROBERT, a celebrated divine of the Church of England, the son of a London merchant, born at Hackney in 1634, and educated at Westminster School and Christ Church, Oxford. In 1660 he was chosen public orator of the University of Oxford; in 1663 he was appointed a prebendary of

SOUTH AFRICAN REPUBLIC—SOUTH AMERICA.

Westminster, and admitted D.D.; in 1670 he was made canon of Christ Church; in 1676 he went to Poland as chaplain to the English ambassador, and on his return became rector of Islip, in Oxfordshire. He died in 1716. His sermons have been much admired. He also wrote an account of his journey to Poland, and other works.

South African Republic. See *Transvaal*.

South America is a vast peninsula of a roughly triangular form, with its apex pointing southward, extending in length from lat. 12° 30' N. to Cape Horn in lat. 55° 59' S. Its greatest length is 4800 miles; its greatest breadth 3230 miles; area, nearly 7,000,000 sq. miles. Some of the general features and relations of S. America to N. America are already described under *America*, but supplementary particulars are here given.

Physical Features.—S. America is united to N. America by the Isthmus of Panamá. The coast-lines of S. America, particularly the west, are comparatively little broken or interrupted by indentations, and in this respect resemble those of Africa. Towards the southern extremity is a group of islands, forming the archipelago of Tierra del Fuego. They are penetrated in every direction by bays and narrow inlets, ending often in glaciers. The mountainous and elevated tracts of the continent are chiefly limited to the borders of the Pacific and Atlantic Oceans; the intervening space being occupied by a great series of plains, reaching from one extremity of the continent to the other, at an elevation generally less than 1000 feet above the level of the sea. There are four chief mountain systems, the most remarkable of which is the Andes, that stretch along the whole of the west coast from south to north for a distance of 4500 miles. They are of inconsiderable width comparatively, but attain great elevations, ranking in this respect next to the Himalaya Mountains; the highest known peak, Aconcagua, in Chili, being 22,860 feet high. (See *Andes*.) The second system is that of Paríma, also called the Highlands of Guiana, in the north-east; culminating point, Maravaca, about 10,500 feet high. The third system is near the north coast, and is known under the general name of the Coast Chain of Venezuela; culminating point, the Silla de Caracas, with an elevation of 8600 feet. The fourth is that of Brazil in the south-east; culminating point, Itatiaia, 10,040 feet high. There are altogether upwards of thirty ac-

tive volcanoes in South America. They all belong to the Andes, and consist of three separate and distinct series: the series of Chili, of Peru and Bolivia, and of Quito. The loftiest is Gualateiri in Peru, which reaches a height of 21,980 feet. The immense plains are one of the remarkable features of South America, sometimes stretching for hundreds of miles without exhibiting the slightest perceptible inequality. They are variously designated, being known as *pampas* in the south, as *seltas* in the Amazon region, and as *llanos* in the north. All the South American rivers of any magnitude carry their waters to the Atlantic. The principal rivers are the Amazon, the Orinoco, and the Plata (which see), the first being the greatest as regards volume of water among the rivers of the world. One of the most singular features in the hydrography of South America is the water connection existing between the Orinoco and the Amazon through the natural channel of the river Cassiquari. As explained under *Brazil* (which see) it would not be difficult to establish inland communication by water from the Orinoco to the Plata. The lakes of any considerable size are few; the largest, Lake Titicaca, in the Andes, covers an area of above 4000 square miles.

Climate and Productions.—Naturally there are considerable diversities of climate in the different parts of the continent, but only in comparatively few are the extremes of heat and cold very great, and on the whole South America is neither very hot nor unhealthful, though so much of it is within the tropics. Over great part of it the rains are adequate, and in many parts abundant; but on the west coast there are small regions where rain seldom or never falls. The most distinguishing feature of the vegetation of South America is its prodigious forests, which cover about two-thirds of the whole continent, and yield valuable timber, ornamental woods and dyewoods, cinchona, india-rubber, vegetable ivory, &c. In the tropical regions vegetation is on the grandest scale, grandeur also being combined with great beauty. Fruits abound, including oranges, limes, pine-apples, mangoes, bananas, pomegranates, and many others. Southward of the line coffee, sugar-cane, maize, and cacao are notable products. The chief vegetable products exported are coffee, rubber, cotton, wheat, cacao, maize, and sugar. Among plants specially belonging to South America are cacao, cinchona, coca, and Paraguay tea.

Amongst the domesticated native animals of South America are the llama and alpaca, both used as beasts of burden, and yielding a kind of hair which is exported and manufactured into tissues. Horses, at first imported, and cattle now roam wild over the southern plains. Large numbers of sheep are also reared, and wool, hides and skins, live animals, meat, &c., are now exported. Gold and silver, copper, nitre, guano, and precious stones are also products of South America.

People.—The aborigines of South America are undoubtedly of the same race as those of North America, as there exists a very striking general physical resemblance between the native races throughout the whole of the American continent, from Cape Horn to Behring's Straits. (See *America and Indians*.) They are almost all of a copper colour, with long black hair, deep-set black eyes, aquiline nose, and often handsome slender form. In South America these red men are far more numerous than in North America, and though many are half-civilized, a greater number are in a state of barbarism. A considerable portion of the population also consists of persons of Spanish and Portuguese blood, and along with these a far greater number of mixed Indian and European blood, more or less civilized and forming an important element. To these are being added numbers of Spanish, Italian, and German immigrants.

Divisions.—South America comprises the republics of Colombia, Ecuador, Venezuela, Peru, Bolivia, Chili, Argentina, Brazil, Paraguay, and Uruguay, the colonies of British, French, and Dutch Guiana, and the Falkland Islands (British). Panamá, now a separate state, might be added. The areas and populations are as follows:—

	Area, sq. m.	Pop.
Colombia.....	465,000	4,000,000
Ecuador.....	123,000	1,500,000
Venezuela.....	365,000	2,500,000
Peru.....	440,000	4,000,000
Bolivia.....	472,000	2,000,000
Chili.....	293,000	3,250,000
Argentine Republic.....	1,200,000	6,000,000
Paraguay.....	98,000	700,000
Uruguay.....	72,000	1,000,000
Brazil.....	3,124,000	16,000,000
British Guiana.....	109,000	300,000
French „.....	30,000	35,000
Dutch „.....	50,000	90,000
Falkland Islands.....	6,500	2,000
	6,847,500	41,377,000

Discovery, &c.—The first discoverer of the continent of South America was Christopher

Columbus, who reached the mouth of the Orinoco in his third voyage (1498). The adventurer who followed next was Alonso de Ojeda, a Spaniard, who examined the coast of Venezuela. Ojeda was accompanied by Amerigo Vespucci, a native of Florence, who, on his return to Spain, published an account of his voyage, and whose name gradually came to be given to the continent. Brazil was discovered in 1500 by Vincent Yanez Pinzon, who explored the mouths of the Amazon. Later in the year Alvarez Cabral reached the coast of Brazil farther south than the point touched by Pinzon, and took possession of the country in the name of the King of Portugal. In 1513 Vasco Nuñez de Balboa crossed the Isthmus of Darien, and discovered the Pacific Ocean. In 1531 Pizarro embarked at Panamá with a small force, and made himself master of Peru. Almagro, a companion of Pizarro, pushed southwards into Chili, and in 1537 the country between Darien and Peru was traversed by Vadillo, and Quito was soon after taken possession of by the Spaniards. In 1540 Gonzales, the brother of Pizarro, crossed the Andes and came upon the Amazon, which Orellana, one of his officers, descended to the ocean. In the meantime Juan de Solis had discovered the La Plata in 1515, and Fernando Magellan sailed along the south-east coast and through the strait that bears his name into the Pacific (1520). In 1526 Sebastian Cabot ascended the Paraná and Paraguay, and established two or three forts, and in 1536 the city of Buenos Ayres was built. The discoveries of the Spanish and Portuguese gave the possession of almost the whole of South America to these nations—Portugal holding Brazil, while Spain held the remainder. The colonial system of Spain was a highly vicious and oppressive one, and the colonies seized the first opportunity to cast off their allegiance to the mother country, early in the 19th century, when Spain was in difficulties from Napoleon's conquests. The Spaniards attempted to bring them back to their allegiance by force, and a series of struggles took place between the colonial and Spanish troops which lasted till 1824, when the independence of the colonies was finally secured.

Southampton, a parl. and co. borough and seaport of England, in the county of Hants, on a peninsula at the mouth of the Itchen, near the head of Southampton Water, 18 m. N.W. of Portsmouth, and 79 m. S.W. of

SOUTHAMPTON — SOUTH AUSTRALIA.

London. (See map at *Portsmouth*.) It is built on rising ground, and consists of an old and a new town, the former at one time surrounded by walls flanked with towers, of which portions still remain; and entered by several gates, of which three, still standing, bear the names of West Gate, South Gate, and Bar Gate. The last, a remarkable structure, and large enough to contain the guild-hall in the upper part of it, is now, owing to the growth of the town, nearly in its centre, and being placed across the principal street, divides it into two parts, that to the north being named Above-bar, and that to the south Below-bar or High Street. The streets in the older quarters are very irregular, while those in the more modern portion present many fine ranges of building. St. Michael's, the oldest of the churches, situated in the west part of the town, is a spacious Norman structure with many interesting features. Other buildings are the Hartley Institution and University College, town-hall, grammar-school, polytechnic, athenæum, custom-house, Watts memorial hall, infirmary, almshouses, ordnance survey offices, &c. About 6 miles from Southampton, and 1 mile from Netley Abbey, is the Royal Victoria Hospital for sick soldiers. There is ample dock accommodation (including a great graving-dock), and Southampton is the most important mail-packet station in the kingdom. The industries comprise brewing, coach-building, iron-casting, sugar-refining, and ship-building. Southampton claims to be a borough by prescription, but its earliest known charter was granted by Henry II. Since the time of Edward I. it has returned two members to parliament. Pop. (p. bor.), 120,215.

Southampton, EARL OF, THOMAS WRIOTHESLEY, first earl, born about 1490, and educated at Cambridge, became lord-chancellor of Henry VIII. in 1544. He was one of the executors of the will of Henry, and was created Earl of Southampton by Edward VI. Died 1550.—**HENRY WRIOTHESLEY**, third earl, grandson of the preceding, born 1573, was a patron of Shakspeare, who dedicated to him the poems of *Venus and Adonis*, and the *Rape of Lucrece*. He was a friend of the Earl of Essex, and was accused of complicity in the latter's treasonable designs. He was convicted and sentenced to death and attainder; but the death sentence was remitted by Elizabeth, and the attainder was removed by parliament after the accession of James. He was

a firm supporter of liberty, and in 1621 was committed to close custody by the king, but was released through the influence of Buckingham. He aided the Dutch in their struggle against Spain, and died at Bergen-op-Zoom, 1624.—**THOMAS WRIOTHESLEY**, fourth earl, son of the preceding, born 1600, was at first a supporter of the Commons in resisting the encroachments of Charles I., but with Strafford went over to the royal side, and was made a privy-councillor. Being one of the leaders of the moderate party, he lived unmolested in England during the Commonwealth. Upon the restoration of Charles II. he was made lord high treasurer. Died 1667.

Southampton Water, an inlet of the sea, in the south of England, about 11 miles in length, running from the Solent into Hampshire in a n.w. direction. It receives the rivers Anton, Itchen, and Hamble. The tidal-wave being intercepted each way by the Isle of Wight it has four tides in the twenty-four hours. The port of Southampton is situated near its head.

South Australia, a British colony forming the central of the three sections (running north and south) into which Australia is divided. It originally comprised the area of Australia lying between 132° and 141° of E. lon., with 26° s. lat. for its northern boundary, and the Southern Ocean for its southern boundary. To this has been added a strip of land on the west, which brings the boundary on that side to 129° E. lon.; and on the north an enormous district, now known as the Northern Territory, extends to the Indian Ocean. On the west it is bounded by Western Australia; on the east by Victoria, New South Wales, and Queensland; on the south by the South Pacific Ocean; and on the north by the Indian Ocean and the Gulf of Carpentaria. Its length from north to south is 1850 miles; its breadth from east to west 650; its area 903,690 sq. miles. The southern coast-line, which is more indented than in any other part of Australia, extends about 1500 miles from N.W. to S.E., embracing Spencer and St. Vincent Gulfs, with York Peninsula and Kangaroo Island. The northern coast has several important bays and gulfs, the chief of which is Van Diemen Gulf and part of the Gulf of Carpentaria. There are three ranges of mountains: the Mount Lofty range, which runs in a northerly direction from Cape Jervis; the Flinders range, on the north-eastern side of Spencer's Gulf; the Gawler range, extending from near Port Augusta

SOUTH AUSTRALIA — SOUTH CAROLINA.

to Streaky Bay. The highest point in any of these ranges is not much more than 3000 feet. The table-land in Eyre Peninsula, west of Spencer Gulf, averages 1300 feet in height. The Murray, which has its rise in the Australian Alps, pursues the lower part of its course in South Australia, and is the only navigable river in the southern part of the colony. Small streams, however, are abundant. There are several navigable rivers flowing to the northern coast—the Roper, Liverpool, Alligator, Daly, &c., and on this coast is the fine harbour of Port Darwin. In the southern part of the colony are several large salt-water lakes—including Lakes Torrens, Eyre, Gairdner, &c. The southern portion of this colony is of a diversified nature, having great areas of excellent agricultural land, extensive well-wooded mountain ranges, interspersed with barren plains; while the Northern Territory is largely adapted for grazing purposes and is believed to be exceptionally rich in minerals. The climate is generally characterized by great dryness; the very hot months are December, January, February, and March; the other eight months are more enjoyable, although the temperature is never very low. There are now about 3,320,000 acres under cultivation. Large portions of the barren area are being reclaimed by means of artesian wells and waterworks. The soil and climate of the south are admirably adapted for the growth of wheat, and barley also yields a good return. Many parts are suitable for the growth of the vine, the olive, the mulberry, the orange, and other fruits; and these are now extensively cultivated. The short-horn breed of cattle thrives well in this colony, but the rearing of live stock is chiefly confined to sheep, of which there are nearly eight millions. For purposes of exploring the arid plains of the interior camels have been introduced and breed fast. The mineral resources of South Australia, and especially of the Northern Territory, have not yet been thoroughly explored, but it has been found to possess vast deposits of copper, iron, and silver-lead, with small quantities of gold, tin, and bismuth. The chief exports are wool, wheat and flour, copper ore, wine and brandy. The exports in 1907 were valued at £9,491,000, the imports at £4,815,000. There are about 1900 miles of railway, and 5500 miles of telegraph and telephone, including the overland line of telegraph from Adelaide to Port Darwin on the north coast. The con-

stitution dates from 1856. The executive is vested in the governor and a responsible ministry. Parliament consists of a legislative council of eighteen members, and a house of assembly composed of forty-two members, elected for three years by adult suffrage. No state aid is given for religious purposes, but education, which is compulsory up to a certain standard, is paid partly from fees and partly from the revenue of public lands set aside for that purpose. The revenue and expenditure are each between £2,000,000 and £3,000,000. The state is represented in the federal senate by six, and in the house of representatives by seven members. South Australia was first occupied in 1836 by emigrants from Great Britain sent out by a Colonization Association. They found a convenient landing-place in the Gulf of St. Vincent (now Port Adelaide), and selected the site of Adelaide, their future capital. Under the lavish administration of the early governors the colony got into financial difficulties, but retrenchment, and especially the discovery in 1843 of copper deposits, secured its prosperity. This prosperity was seriously retarded by the migration which took place when gold was discovered in Victoria in 1851. Drought has sometimes proved a scourge to the colony, but the agricultural, pastoral, and mineral industries are in a flourishing and steadily progressive condition. The population in 1901 was 362,604. *The Northern Territory*, formerly known as Alexandra Land, extends from the 26th parallel of south latitude northward to the Indian Ocean, and comprises, also, the islands on the northern coast; area, 523,620 square miles. This territory was first explored by the Dutch; a settlement was planted by the British at Port Essington in 1831; and in 1863 it was given to South Australia. Comparatively little has been done in the way of settlement, though mining and stock-rearing are both carried on. The pop. of 5000 includes many Chinese. Palmerston, on Port Darwin, is the official centre, with a fine harbour.

South Bend, a town of the U. States, the chief town of St. Joseph county, state of Indiana, on the St. Joseph river. It has important manufactures of railway-wagons, agricultural implements, furniture, doors and window-frames, sewing-machines, paper, &c. It possesses two R. Catholic colleges, the University of Notre Dame, &c. Pop 35,999.

South Carolina. See *Carolina*.

SOUTHCOTT—SOUTH ISLAND.

Southcott, JOHANNA, a religious fanatic, whose extravagant pretensions attracted a numerous band of converts in London and its vicinity. She was born in the west of England about the year 1750, of parents in very humble life, and, being carried away by a heated imagination, gave herself out as the woman spoken of in the Book of Revelations. She announced herself as the mother of the promised Shiloh, whose birth was to take place on the 14th of October, 1814. She died shortly after this date, and her followers long confidently anticipated her speedy resurrection. They numbered at one time as many as 100,000, but are now extinct.

Southend-on-Sea, a mun. bor. and watering-place of England, on the estuary of the Thames, Essex, 42 miles east of London by rail. It is a popular resort of Londoners, both on account of its facilities for sea-bathing and for its pleasant outlook over the Thames. Its pier is one of the longest in England (nearly 1½ mile). Pop. 28,857.

Southern Bulgaria. See *Eastern Roumelia, Bulgaria*.

Southern Cross, a constellation of the southern hemisphere, composed of four stars, one of which is of the first, and two of the second magnitude. They form a figure not unlike a cross, especially when seen above the pole, and are the best-known of the southern constellations.

Southerne, THOMAS, English dramatist, born near Dublin in 1660, educated at Trinity College, Dublin. He was called to the bar at the Middle Temple, but soon abandoned the law for dramatic literature. He wrote in all ten plays, of which the most popular were *The Fatal Marriage*, and *Oroonoko*. He died in 1746.

Southernwood. See *Wormwood*.

Southey (sou'thi), ROBERT, an English poet and miscellaneous writer, was the son of a linen-draper of Bristol, where he was born in 1774. He was sent to Westminster School in 1788, and soon gave proof of distinguished talents. He was dismissed, however, in 1792 for a satirical paper on flogging published in a school journal, *The Flagellant*, and shortly afterwards entered Balliol College, Oxford, with the view of studying for the church. For this, however, the ultra-liberal opinions which he had formed were very ill adapted, and he turned his attention to medicine, but soon gave it up also. He left Oxford in 1794, and having formed an acquaintance with Coleridge, they were married to two

sisters in the same year, 1795. A quixotic scheme to revive the golden age in America having been abandoned for want of means, Southey, after selling his *Joan of Arc* for £50, sailed for Portugal with his uncle, the chaplain to the English factory at Lisbon. After his return to England he (1798) entered Gray's Inn, with the view of studying law, but never made any progress in it. He again visited the Peninsula in 1801. Previous to this time he had published several poems, including a violent democratic piece entitled *Wat Tyler*. But he had now renounced his democratic opinions, and gone to what many considered an opposite extreme. His first poem which attracted much notice was *Thalaba the Destroyer*, a metrical romance published in 1802. In 1803 he fixed his permanent residence at Greta, near Keswick, in the heart of the English lake district, where he had Wordsworth and Coleridge for neighbours. From this period his intellectual activity was untiring, and he continued for a period of almost forty years to issue annually at least one, and often several works, besides contributing largely to different periodicals. Having lost his first wife, he, in 1839, married Caroline Anne Bowles (1786-1854), herself a writer of some eminence. Soon after he sank into a state of mental imbecility, and died 21st March, 1843. In 1807 Southey received a pension from government, and in 1813 was appointed poet-laureate. The University of Oxford conferred on him the degree of LL.D. in 1821, and in 1835 he received an augmentation of his pension. Among his poetical productions may be mentioned—*Joan of Arc*; *Thalaba*; *Madoc*; *The Curse of Kehama*; *Roderick, the last of the Goths*; a *Poet's Pilgrimage to Waterloo*; and a *Vision of Judgment*. Several of his minor pieces show to more advantage than his larger poems. His prose works are remarkable for their excellent style. Among others may be mentioned his *Life of Nelson*, which is almost a perfect model of its kind; *Life of Wesley*, *History of Brazil*, *The Book of the Church*, and *The Doctor*.

South Georgia, a barren snow-covered island in the South Atlantic, 500 miles E.S.E. of the Falkland Islands, to which it is regarded as belonging.

Southing, in navigation, means the difference of latitude made by a ship in sailing to the southward.

South Island. See *New Zealand*.

South Kensington Museum, now the *Victoria and Albert Museum*, an institution in London originated by the Prince Consort in 1852, and under the direction of the Board of Education. It contains a collection of ancient and modern art as applied to manufactures, a gallery of British oil and water-colour paintings and sculptures, reproductions of ancient sculptures, and the National Art Library. Other departments contain collections of substances used for food, and of materials employed in building and construction. The loan department is a special feature. The foundation-stone of new buildings was laid in 1899, when the name was changed. There is a branch at Bethnal Green.

South Molton, a municipal town of England, in Devonshire, with manufactures of serges, woollen cloth, and leather. Pop. 2848.

South Polar Expeditions, exploring expeditions in the Antarctic regions. The first discovery of land in the proximity of the Antarctic circle was made accidentally by Dirk Cherrits, a Dutch navigator, who, in endeavouring to enter Magellan's Straits, was driven southward to lat. 64° , where he discovered the South Shetland Islands. Captain Cook is the first who is known to have sailed within the Antarctic circle. He reached the southernmost point attained by him on 30th January, 1774, in $71^{\circ} 10' \text{ s.}$ and 107° w. In 1821 the Russian Bellinghausen discovered Peter the Great and Alexander Islands. Enderby Land and Kemp Land were discovered by Biscoe in 1831-33. The first of these is the easternmost point of a supposed continuous coast, and lies in lat. about $67^{\circ} 30' \text{ s.}$ Sabrina Land and Balleny Islands were discovered in nearly the same latitude by Balleny in 1839. In 1840 two important exploring expeditions, one French, the other American, reached the southern seas. The French expedition, under Dumont d'Urville, found traces of what they believed to be a continuous coast from 136° to 142° E. , to which they gave the name of Adélie Land. The American expedition, under Wilkes, passed very near the southern magnetic pole, the position of which at the time he calculated to be lat. 70° s. , lon. 140° E. , and traced land from lon. $154^{\circ} 27'$ to $97^{\circ} 30' \text{ E.}$, which Wilkes concluded to be continuous. An English expedition under Sir James Clark Ross in 1841 passed the Antarctic circle about lon. 178° E. , and in $172^{\circ} 36' \text{ E.}$ lon. and $70^{\circ} 41' \text{ s.}$ lat. found a continuous coast

trending south, with mountain peaks 9000 to 12,000 feet in height. The farthest south point reached by Ross was $78^{\circ} 10'$, and this long remained the farthest south latitude attained. In 1900 M. Borchgrevink reached lat. $78^{\circ} 50'$, and located the south magnetic pole in lat. $73^{\circ} 20' \text{ s.}$ and lon. 146° E. Our knowledge of this region has been greatly extended by several recent expeditions, more especially by those under Capt. Scott and Mr. Shackleton respectively, as explained in the article *Antarctic* (which see). A German party in 1901-03 discovered Kaiser Wilhelm II. Land. The Scottish expedition under Bruce (1902-04) also found new land, and did other good work.

Southport, a fashionable watering-place in Lancashire, England, standing on an extensive open bay near the estuary of the Ribble, $18\frac{1}{2}$ miles by rail north of Liverpool. The streets are broad and elegantly built, the houses generally being in the villa style, with gardens in front. Among the attractions of the town are the Pavilion and Winter Gardens, which include a concert-hall, gardens, marine and fresh-water aquaria, &c.; the botanic gardens, a fine public park, the Free Library and Fine Art Gallery with newsrooms, the Victoria Baths, said to be the largest in the kingdom, an extensive bathing beach, tramways, promenades, and a pier 1480 yards in length. Pop. 48,083.

Southsea. See *Portsmouth*.

South Sea Bubble, a disastrous financial speculation which arose in England in the beginning of the 18th century. It originated with the directors of a joint-stock company, which, in consideration of certain exclusive privileges of trading to the South Seas, offered the government easier terms for the advance or negotiation of loans than could be obtained from the general public. In 1720 the proposal of the company to take over the entire national debt (at this time about £31,000,000) in consideration of receiving annually 5 per cent was accepted, and the company promised on return for this privilege (as it was regarded) a premium in their own stock of £7,500,000. Professing to possess extensive sources of revenue the directors held out promises to the public of paying as much as 60 per cent on their shares. It became soon apparent that such magnificent promises could never be fulfilled, and in a few months' time the collapse came which ruined thousands. The directors had been guilty of fraudulent deal-

ings, and the chancellor of the exchequer and others in high positions were implicated.

South Sea Islands. See *Polynesia*.

South Shetlands, a group of islands in the Southern Ocean, south of S. America, on the Antarctic circle, originally discovered by a Dutch seaman named Dirk Cherrits in 1599. The islands are uninhabited, and covered with snow the greater part of the year.

South Shields. See *Shields*.

Southwark (south'ark), a metropolitan and parl. bor. in the county of London, south of the Thames, opposite the City of London, including the ancient St. Saviour's church, now the cathedral of the bishopric of Southwark (founded 1905), Spurgeon's Metropolitan Tabernacle, Guy's Hospital, and Bethlehem Hospital. The parl. bor. has three divisions, West, Rotherhithe, and Bermondsey. Pop. (met. bor.), 206,180.

Southwell, a town of England, in Nottinghamshire, 11 miles N.E. Nottingham, giving name to a diocese comprising Notts and Derbyshire, established in 1884. Its cathedral is an ancient edifice of considerable architectural interest. Pop. 3161.

Souvalky, a town of Russian Poland, capital of gov. Souvalky, with considerable trade and manufactures. Pop. 27,000.

Souvestre (sô-ves-tr), EMILE, a popular French novelist and dramatist, born at Morlaix, Finistère, in 1806. After editing a liberal paper at Brest for some time he settled in Paris (1836), where he attracted attention by his sketches of Brittany, and was soon recognized as one of the foremost writers of the day. Among his best works are *Les Derniers Bretons*, *L'Homme et l'Argent*, *Confessions d'un Ouvrier*, *Un Philosophe sous les Toits*. The last named received the prize from the French Academy in 1851. Of his dramas the most noteworthy are *Henri Hamelin*, *L'Oncle Baptiste*, *Le Mousse*, &c. Souvestre is noted for the high moral tone of his writings, and for his sympathy with the poor. He died in 1854.

Sovereign, the person in whom is vested the highest governing power in a state.

Sovereign, a gold coin, the standard of the English coinage. It exchanges for twenty shillings sterling, and has a standard weight of 123.274 grains, being of 22 carats fineness, and coined at the rate of 1869 sovereigns from 40 lbs. troy of gold.

Sowbread. See *Cyclamen*.

Sowerby, a town of England, in the West

Riding of Yorkshire, about 4 miles S.W. of Halifax. It gives name to a parliamentary division. Pop. 3653.

Sowerby, JAMES, born in 1757, originally a miniature and portrait painter, latterly devoted himself to botany, and became a noted illustrator of botanical and other works. His *English Botany* (as re-edited) is still valued very highly. Died 1822. Other members of the Sowerby family distinguished themselves in similar fields, especially by their illustrated works on botany and conchology.

Sowerby Bridge, a town of England, in the West Riding of Yorkshire, on the Rochdale Canal and the River Calder, with manufactures of cottons and woollens, chemical, iron, and other works. Pop. 11,477.

Sowing-machines, machines for sowing grain. Among the simplest and earliest forms of sowing-machine is a cylindrical vessel with small holes at regular intervals round its circumference for sowing round seed, such as turnip-seed. The machine is placed on wheels, and drawn over the land at a regulated speed, when by its mere revolution the seed is delivered with tolerable uniformity. Another class of machines consists of those having a fixed seed-box, the delivery from which is regulated by internal revolving machinery. The holes for delivery are placed at regular intervals near the bottom of one side of the seed-box. One of the best modes of delivery is that adopted in what are called Suffolk drills, in which the delivery is regulated by cups attached to projecting arms on a revolving disc. The cups dip into the seed and lift successive portions, which they deliver at the height of their revolution into a funnel placed for its removal to the ground. Another mode of delivery is by an oscillating movement given to a false bottom of the seed-box. The real and the false bottom are both provided with holes, and when the holes correspond the seed falls. An objection is made to these machines that they are liable to cut the seed. In broadcast machines no special apparatus is needed for conveying the seed to the ground, the intervals of the holes causing it to fall evenly on the ground. In the machines called drills the funnel into which the seed is dropped is designed to convey it accurately into the row in which it is to be sown, the rows being parallel to the course of the machine. For this purpose the funnel terminates in a heavy coulter, which opens a channel of

uniform depth for the deposit of the seed, which is then covered by a harrow. By further improvements drop drills and dibbling machines have been contrived, which not only deposit the seed in rows but at regular intervals within the rows. The regular delivery of manure is also secured by similar machines.

Sow-thistle, the name given to British species of a genus of composite plants (*Sonchus*). There are about fifty species, mostly herbaceous, but some forming shrubs or small trees. Some of the first may be considered cosmopolitan, while the woody sorts are almost restricted to the Canaries and the island of Madeira. The most common species in Great Britain is the common sow-thistle (*Sonchus oleraceus*). It is very abundant as a weed, is greedily fed upon by many animals, and is sometimes used on the European continent as a pot-herb. It grows to a height of 2 or 3 feet, with a branching stem and small yellow flowers. The *S. alpinus* forms a tall and fine plant, with fresh and sharply-defined foliage, and large heads of beautiful blue flowers. It is found in the mountains of Scotland as well as in Switzerland.

Soy, a dark-coloured sauce prepared by the Chinese from the seeds of a sort of bean (*Soja hispida*). It is made by boiling the seeds until they become soft, and mixing with them an equal weight of wheat or barley meal coarsely ground, a certain proportion of salt and water being added. The seeds are, besides, employed in China and Japan as food.

Soymi'da. See *Redwood*.

Spa, or **SPAA** (spä), a town of Belgium, in the province of Liège and 16 miles south of the town of Liège. Its chief importance is due to its effervescent, chalybeate, saline, mineral waters, which are much used by visitants on the spot, and also extensively exported. It has enjoyed a long celebrity, and has given its name to many mineral springs. There are many fine buildings and numerous attractions for visitors. Pop. 8200.

Spaccaforno, a town of Sicily, prov. of Syracuse. Near it are some curious prehistoric artificial caves. Pop. 8588.

Space, in philosophy, extension considered independently of anything which it may contain, extension considered in its own nature. Aristotle defines it as the possibility of motion, and possessing the quality, therefore, of being—potentially, not actually—divisible *ad infinitum*. Space and

Time are two of the so-called innate ideas. According to one school these ideas are intuitive to the mind; according to another they are the result of experience. Locke maintained that we acquire the idea of *space* by the senses of sight and touch. Space and Time, according to Kant, are the ultimate forms of external and internal sense, and these forms are contained *a priori* in the human mind. Space is the form of external sense by means of which objects are given to us as existent without us, and as existent also apart from and beside one another. If we abstract from all that belongs to the matter of sensation (in any perception), there remains behind only space, as the universal form into which all the materials of the external sense dispose themselves. Herbert Spencer, while making no attempt to analyse the notion of space, says: 'It will be sufficient for present purposes to say that we know *space* as an ability to contain bodies. I am aware that this is no definition properly so called, seeing that as the words 'contain' and 'bodies' both imply ideas of space, the definition involves the thing to be defined. But leaving out as irrelevant all considerations of the mode in which we come by our ideas of *space*, and of bodies as occupying *space*, it will I think be admitted that the antithesis between bodies and an ability to contain bodies truly represents the contrast in our conceptions of the sensible non-ego (matter) and the insensible non-ego (*space*).'

Spada, **LIONELLO**, Italian painter, Bolognese school, born at Bologna 1576, died at Parma 1622. He became the pupil of Caravaggio, with whom he travelled. On his master's death he returned to Bologna, and spent his latter days at the court of the Duke of Parma. Among his works (which are well known in European galleries) S. Dominic burning the heretical books, and an altar-piece in the church of S. Domenico at Bologna, are considered his best.

Spadix, in botany, a form of the inflorescence of plants, in which the flowers are closely arranged round a fleshy peduncle, and the whole surrounded by a large leaf or bract called a spathe, as in palms and arums.



a, Spathe, and b, Spadix of *Arum maculatum*.

Spagnoletto (spán-yo-let't5; 'little Spaniard'), a celebrated painter, whose true name was Giuseppe Ribera, or Ribeira, born at Xativa, in Valencia, 1588; died at Naples, 1656. He was at first a pupil of Caravaggio, but afterwards improved himself by the study of the works of Raphael and Correggio, at Rome and Parma. Settling in Naples he was appointed court painter, in which post he took the leading part in an infamous plot against his rivals Carracci, D'Arpino, Guido, Domenichino, &c. Ribeira excelled in the representation of terrible scenes, such, for example, as the Flaying of St. Bartholomew. His works are not uncommon in European galleries.

Spahis, or SIPAHS, the name given to the irregular Turkish cavalry, which is said to have been organized by Amurath I., and which gave place in 1826 to regular cavalry. Their usual arms were the sabre, lance, and javelin. The French call a body of light cavalry raised in Algeria by the name of spahis. The name *sepoys* given to the native troops in British India is the same word.

Spain (Spanish, *España*), a state in the south-west of Europe, forming with Portugal the great south-western peninsula of Europe. It is separated from France on the north-east by the chain of the Pyrenees, and is otherwise bounded by Portugal and the Atlantic and Mediterranean. In greatest breadth N. and S. it measures 540 miles; greatest length E. and W., 620 miles; total area, 196,000 sq. miles; pop. 18,618,086. Besides the Balearic and Canary Islands, which are reckoned European territory, Spain now retains, of her once extensive and magnificent colonial possessions, which included till recently Cuba and Porto Rico in the West Indies, the Philippines and some neighbouring islands, &c., only a large strip on the west coast of the Sahara; and the island of Fernando Po, with some smaller West African possessions. Their total area is about 80,500 sq. miles; pop. about 292,000. Spain formerly comprised the ancient kingdoms and provinces of New and Old Castile, Leon, Asturias, Galicia, Extremadura, Andalusia, Aragon, Murcia, Valencia, Catalonia, Navarre, and the Basque Provinces. These since 1834, for administrative purposes, have been divided into forty-nine provinces, including the Balearic and Canary Islands. The capital is Madrid; next in population are Barcelona, Valencia, Seville, Malaga, Murcia, Cartagena, and Saragossa.

Physical Features.—The coast-line is not

much broken, but sweeps round in gentle curves, presenting few remarkable headlands or indentations. The interior is considerably diversified, but its characteristic feature is its central table-land, which has an elevation of from 2200 to 2800 feet, and a superficial extent of not less than 90,000 sq. miles. It descends gradually on the west towards Portugal; but on the east, towards the provinces of Catalonia and Valencia, it presents an abrupt steep or line of cliffs, with the character of an ancient sea margin. It is bounded on the N. by the Asturian and Cantabrian Mountains, reaching an elevation of about 8500 feet; on the S. by the Sierra Morena; and is crossed from east to west by the rivers Douro, Tagus, and Guadiana. Between these limits it is intersected by two important ranges of mountains running nearly E. and W., the northern being the Guadarrama with its continuations, separating the valleys of the Douro and Tagus, and attaining in one of its peaks a height of 8200 feet; and the southern, the Sierra de Toledo and its continuations between the Tagus and the Guadiana. South of the Sierra Morena is the valley of the River Guadalquivir. Besides these ranges there is the chain of the Pyrenees, which, though partly belonging to France, presents its boldest front to Spain and has its loftiest summits within it. The highest peak in this range is La Maladetta or Pic de Netou (11,165 feet); but the highest peak in Spain is Mulahacen (11,705 feet), belonging to the Sierra Nevada in the south. The latter chain possesses some of the wildest scenery in Europe. The chief rivers enter the Atlantic, but in the north-east is the Ebro, a tributary of the Mediterranean. The Douro, Tagus, and Guadiana belong partly to Portugal. The lakes are few and unimportant. The whole country teems with mineral wealth, the minerals including in greater or less quantities gold, silver, quicksilver, lead, copper, iron, zinc, calamine, antimony, tin, coal, &c. The exploitation of the minerals has, however, in recent times been mostly accomplished by foreign capital, while most of the ore is exported to foreign countries in its raw state.

Climate, Vegetable Products, &c.—The climate varies much in different localities. On the elevated table-land it is both colder in winter and hotter in summer than usual under the same latitude. In the plains and on the coasts the hot summer is followed by a cold rainy season, terminating in April in

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a beautiful spring. The mean temperature at Malaga in summer is 77° F., in winter 57°; at Barcelona 77° and 50°; and at Madrid 75° and 44·6°. The rainfall is small; in the interior between 8 and 12 inches per annum. In some parts of the south the climate is almost tropical. The hot south wind of Andalusia, known as the *solano*, and the cold north wind called the *gallego*, are peculiar to Spain. About one-eleventh of the acreage is under wood; the more remarkable trees being the Spanish chestnut and several varieties of oak, and in particular the cork-oak. Fruits are extremely abundant, and include, in addition to apples, pears, cherries, plums, peaches, and apricots, the almond, date, fig, orange, citron, olive, and pomegranate; and in the lower districts of the south, the pine-apple and banana. The culture of the vine is general, and great quantities of wine are made, both for home consumption and exportation. The more important farm crops are wheat, barley, rye, maize, oats, rice. In the south cotton and the sugar-cane are grown. Hemp and flax, esparto, the mulberry for rearing silk-worms, saffron, liquorice, are also to be mentioned. The only large animals in a wild state are the wolf, common in all the mountainous districts, and the bear and chamois, found chiefly in the Pyrenees. Domestic animals include the merino sheep in great numbers, horses, mules, asses, horned cattle, and pigs.

Manufactures, Trade, &c.—The manufactures of Spain are not as a whole important, but considerable advances have been made in recent times. The most important industries are the manufactures of cottons, woollens, linens, cutlery and metal goods, paper, silk, leather, glass, cork, sugar, and tobacco, besides wine, flour, and oil. The chief articles of export are iron ore, wine, copper and copper ore, lead ore, oranges, olive-oil, raisins and grapes, almonds, and wool. In recent years the total imports have averaged £35,000,000 per annum; the exports about the same. The chief trade is with Britain, France, Germany, and the United States. In 1907 Britain imported metals and ores (chiefly iron), fruits, &c., valued at £16,843,000. Trade suffers from want of good roads and navigable rivers; railways have an aggregate length of 9500 miles, but much is still required. The chief denomination of money is the *peseta*, nominally equal to the franc, but actually worth about 7½d.

Government, &c.—The present constitution dates from 1876, and enacts that the government be a constitutional monarchy, the legislative power resting 'in the Cortes with the king,' the executive being vested, under the monarch, in a council of nine ministers. The Cortes consists of two independent bodies—the Senate and Congress, the former consisting of 360 members, one-half of whom are elected by corporations and similar bodies, the other half being life senators nominated by the crown, and 'senators by their own right.' The Congress is formed by deputies in the proportion of one to each 50,000 of the population. The various provinces, districts, and communes are governed by their own municipal laws with local administration. Each commune has its affairs directed by an elected *ayuntamiento*, and each province has its *diputacion provincial*, or parliament, whose members are elected by the *ayuntamiento*. The revenue, raised chiefly by direct and indirect taxation, stamp-duties, government monopolies, income from state property, &c., amounts annually to over £40,000,000, and the expenditure to about the same amount, while the debt, funded and floating, amounts to £382,000,000.

Army and Navy.—The army consists of (1) a permanent army, in which all above the age of twenty are liable to serve for three years; (2) an active reserve with three years' service; and (3) a sedentary reserve, with service for other six years. By the payment of £60 exemption from service may be obtained. The army is organized in seven territorial army corps, besides troops in the Balearic Islands, the Canaries, Ceuta, and Melilla. The peace strength is about 83,000. The Spanish navy was practically annihilated in the war with the United States in 1898. It now consists of one battleship, two armoured cruisers, six protected cruisers, and five destroyers, besides torpedo-boats, training ships, &c.

People, Religion, &c.—The people of Spain are of very mixed origin, the most ancient inhabitants, the Iberians (now represented probably by the Basques or Biscayans of the north-east), being afterwards mingled with Celts, Phœnicians, and Carthaginians, Roman colonists, Goths, Jews, and Arabs or Moors. They are generally of medium height and of spare habit, with black hair, dark eyes, and sallow complexion. Under the constitution the state binds itself to maintain the Roman Catholic religion, but a

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restricted liberty of worship is permitted to Protestants, of whom, however, there are very few. There are nine archbishops, the Archbishop of Toledo being primate. Religious communities must be officially registered. They are over 3000 in number. In 1857 an elaborate scheme of education (including compulsion) was proclaimed by the government, but never enforced; and thus education is in a very backward state. Recently, however, there has been a more efficient supervision, but still about 68 per cent of the population can neither read nor write. There are government schools for engineering, agriculture, architecture, fine arts, music, &c., and nine universities.

History.—The most ancient known inhabitants of Spain were the Iberians. To these afterwards were joined certain tribes of Celts, and subsequently the two races united. The Phœnicians made settlements at a very early date, having founded Cadiz about B.C. 1100; later the Greeks founded several cities, and then (B.C. 238) the history of Spain may properly be said to begin with the Carthaginian invasion. Hamilcar Barca undertook, with considerable success, to subjugate the tribes of the Peninsula, and in this effort he was followed by Hasdrubal and Hannibal. War between Rome and Carthage brought the Romans to Spain, and (B.C. 205) ended in their driving out the Carthaginians. (See *Rome* and *Hannibal*.) The Romans then undertook the subjugation of the entire country, but in this they did not completely succeed until after about 200 years. The tribes in the mountains of the north were finally subjugated by Augustus and his generals, and Spain was converted into a Roman province.

In 256 A.D. the country was invaded by the Franks, and after their departure Spain became peaceful until the advent of the Goths. A Visigothic kingdom was established about 418 A.D. But after retaining the mastery of the country for nearly three centuries the Visigoths were in their turn conquered (711 A.D.) by the Saracens under Tarik, and the greater part of Spain became a province of the caliphs of Bagdad. For some years they held it as a dependency of the province of North Africa, but it was afterwards (717) governed by *emirs* appointed by the caliphs of Damascus. Dissensions ultimately arose between the central power and the province, with the result that an independent dynasty was established by Abd al-Rahman at Cordova (756 A.D.),

which received additional power and magnificence from Hisham (788) and his son Al Hakam (796). Meanwhile several small kingdoms had been formed in the mountainous districts of the Pyrenees, probably by descendants of the Visigoths. The chief of these were the kingdoms of Asturias, Leon, Navarre, Aragon, and Castile. These states were often at war with each other, and in the struggle for supremacy Castile and Aragon ultimately absorbed all the others. The rise of these two powerful Christian states in the 11th century was contemporary with the decline and disruption of the Omniade dynasty of the Moslems, and in a struggle between the two religions a famous part was taken by the 'Cid' (which see). It seemed, indeed, at this time as if the Moslem power in Spain was about to be annihilated, but with aid from Africa, and after the death of the Cid, they regained much of their influence. This power was directed at first by the Almoravides, whose caliphs ruled from Morocco, and then by the Almohades, until the latter were defeated (1212 A.D.) in the decisive battle of Las Navas de Tolosa. To the Moors there now remained only the kingdoms of Cordova and Granada, but even these were soon obliged to admit the supremacy of Castile.

By the marriage (1469) of Isabella, the heir to the crown of Castile, with Ferdinand of Aragon, begins the modern history of Spain. The two states thus united retained their own laws, customs, and administration, but their gradual fusion was promoted and largely accomplished by Cardinal Ximenes. To strengthen the central government and curtail the power of the nobility the *Santa Hermandad*, or Holy Brotherhood, was formed (1476) to act as the administrators of justice; the Inquisition was instituted (1481) to promote religious orthodoxy and unity; the Jews were expelled for heterodoxy; and the Moors were completely subjugated by the conquest of Granada (1492) and afterwards expelled. In this same year Columbus discovered the West Indies, and the colonial power of Spain, thus begun, was soon greatly extended.

When Ferdinand died in 1516 his daughter Joanna, who had married Philip, son of Maximilian I., succeeded to the kingdom of Aragon, but her son, Charles I., became regent and ultimately king of the whole of Spain. He was also ruler of the Netherlands, which he inherited from his father, and in 1519 he was proclaimed Charles V.

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emperor of Germany. As the champion of the Catholic Church he successively declared war with the French, the German Protestants, and the Turks. But as the expense of this vast policy overtaxed his own kingdom, and was only partially met by the wealth acquired by the conquest of Mexico (1518) and Peru (1531), he finally retired in despair, and was succeeded (1556) by his son, Philip II.

The internal policy of this monarch was characterized by a severe absolutism in matters political and religious, an extension of the power of the Inquisition, and a unification of the peninsula by the conquest of Portugal. By his foreign policy he caused a revolt in the Netherlands (which see) and lost the northern provinces; failed to establish the Spanish influence in France; and sustained defeat from England by the destruction of the Invincible Armada. He was succeeded (1599) by Philip III., who, by expelling all the Moriscos from his kingdom and engaging in the Thirty Years' war, impoverished the country. Further disasters overtook Spain on the accession of Philip IV. (1621), whose haughty centralizing policy under the minister Olivarez brought about civil war in Catalonia, Andalusia, and Naples; the loss of Portugal and French-Comté; and the independence of the Netherlands. Under his son, Charles II. (1665), a prince who was feeble both in mind and body, the country declined still more, and at his death in 1700 without an heir there began the war of the Spanish Succession. The succession to the throne lay between the Hapsburgs, whose claim was upheld by the Emperor Leopold I., and the Bourbons, whose claim was maintained by Louis XIV. After a prolonged European war (see *Succession Wars*) it was agreed by the Treaty of Utrecht (1713) to acknowledge the Bourbon Philip V. as king of Spain on condition that the Netherlands and the Italian provinces were given to Austria, while England claimed Gibraltar and Minorca.

Under the able administration of Cardinal Alberoni Spain now regained a large part of its power in Europe. This revival was continued under Ferdinand VI., who succeeded to the throne in 1746; but it received its greatest impulse from Charles III. (1759), who developed the agricultural and other resources of his country, and broke the power of the Inquisition by banishing the Jesuits (1767).

The full effect of these and other liberal

measures was arrested, however, by the accession of Charles IV. (1788), whose policy, directed by Godoy (which see), first brought about a rupture with the French Republic, and then a close alliance with France and a war against the British, resulting in the battle of Trafalgar (1805), when the naval power of Spain was destroyed. Spain received further humiliation by the success of Napoleon, the Treaty of Fontainebleau, and the occupation of the country by French soldiers. The result was an insurrection and the abdication of the king (1808) in favour of his son, Ferdinand VII. But Napoleon, who had his own intentions regarding the Spanish throne, caused the whole Bourbon family to be set aside and gave the crown to Joseph, his brother. The Council of Castile gave at first a reluctant assent to this arrangement, but soon the provinces declared war and the council entered into an alliance with Great Britain. As the result of this popular rising Madrid was taken, Joseph Bonaparte retreated, and a junta formed to govern in the name of Ferdinand VII. On the arrival of Napoleon, however, the Spanish army was destroyed, Madrid retaken, Joseph Bonaparte restored, and the relieving British army under Sir John Moore driven back upon Coruña. The Peninsula was now only saved from complete subjugation by the arrival of Wellington with an army in Portugal, and the determined resistance which he offered during several campaigns to Napoleon's generals. In several battles the British army routed the French and advanced into Spain; but it was not until the spring of 1813 that Wellington was able to clear the Peninsula of French soldiers and to fight his way through the Pyrenees into France. In consequence of this success the Bourbon prince, Ferdinand VII., returned and was proclaimed king (1814), but the country made little progress owing to the absolute and illiberal policy which he adopted.

During the Napoleonic war the South American colonies had asserted their independence, Florida had been sold to the United States, and the finances misused; while these things were now aggravated by the despotic rule of a king who dissolved the cortes, set aside the constitution, and re-established the Inquisition. A revolt against this policy took place in 1820 and spread throughout the country, in consequence of which the constitution was re-established, the Inquisition abolished, and (1822) the cortes

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with a liberal majority elected. This movement for liberty, however, was suppressed by the Holy Alliance (which see), under whose sanction a French army entered Spain (1823) and remained there for four years, during which the royal absolutism was restored. In 1829 Ferdinand abolished the Salic law by a 'pragmatic sanction,' and as the result of this his daughter was proclaimed queen, on the death of her father in 1833, under the title of Isabella II.

As this queen was only three years old, her mother, Maria Christina, undertook the regency; but she was opposed by Don Carlos, a brother of the late king, and a serious civil war broke out. The Carlist party achieved considerable success at first, but the civil strife was ultimately brought to an end by the triumph of the royalists (1840) under Espartero and O'Donnell. Notwithstanding this the regent, who found it impossible to control the various factions, retired into France, and Espartero was recognized as regent. In 1843 the young queen was declared of age, and her government was carried on by Narvaez, who had superseded Espartero. By the influence of Louis Philippe, the French king, a marriage was brought about in 1845 between Isabella and her cousin, Don Francisco d'Assiz. For some years after this event the political history of Spain became a medley of party intrigue and petty political change, until in 1866 the severe measures taken against the liberals by Narvaez ended in a military insurrection. This, however, was suppressed by the royal troops, and Generals Prim, Serrano, and O'Donnell were banished.

More successful was the revolution of 1868, headed by Generals Prim and Serrano. The latter entered Madrid in command of the revolutionary troops, and Isabella fled to France. The cortes still declared in favour of the monarchical form of government, and great difficulty was experienced in finding a prince both able and willing to occupy the vacant throne. It was offered to Leopold of Hohenzollern-Sigmaringen, but the jealousy of France caused Napoleon III. to demand the withdrawal of this candidate, and the diplomatic difficulties connected with this matter were the ostensible cause of the Franco-Prussian war. The crown was at length accepted by Amadeus, second son of Victor Emmanuel, and in 1870 he was formally elected king by the cortes. But the various parties, among which the most active were the Carlists

and the federalists, made government difficult, and the king, after three years of strife, resigned his task.

Following this event the cortes declared in favour of a federal republic (1873), and the presidency was intrusted to Castelar; but the course of events made this form of government impossible. Accordingly Castelar and his ministry resigned (1874), and the government of the country was undertaken by the chiefs of the revolution of 1868, headed by Marshal Serrano. Under this military administration vigorous measures were taken to suppress the Carlist rebellion, and the throne was offered (1874) to the son of the exiled Isabella. In 1875 the young king, with the title of Alfonso XII., landed at Barcelona, and successfully established his government. Alfonso XII. died in 1885, and was succeeded by his daughter Maria, but the kingdom passed to his son on his birth in May, 1886. This son, known as Alfonso XIII., took up the reins of government in 1902 from his mother, Maria Christina, who had acted as regent. In May, 1906, he married Princess Victoria Ena of Battenberg, a niece of Edward VII. The war of 1898 with the United States resulted in the loss of Cuba, Porto Rico, and the Philippines.

Language and Literature.—The Spanish language, which is also the language of Mexico and a great part of South America, belongs to the group known as the Romance or Romanic languages. Its formation was influenced by the lengthened duration in Spain of Roman institutions, by the Teutonic element introduced by the Visigoths, and by words of Arabic origin added during the long occupation of the country by the Moors. A number of different dialects developed themselves at an early date, such as the Galician, Catalan, Asturian, &c., but the Castilian took the lead, and came to be considered as the standard of Spanish. The Castilian idiom, which originated in the mountains of the interior of Spain, is characterized by deep and open tones, which now distinguish the Spanish from the Portuguese. The national literature of Spain dates from the 12th century, ballads and metrical romances being its earliest products. To this period the Poema del Cid is usually ascribed, an epic in which are narrated the adventures of Rodrigo Diaz de Bivar, the national hero. Following this early historical and legendary theme came the didactic verse of the Benedictine monk Gonzalo

Berceo (1198-1268). To the same period belong two lengthy narrative poems on Alexander the Great and Apollonius of Tyre, both of which are written in single-rhyme quatrains. But perhaps the most remarkable piece of writing of this age was *Las Siete Partidas* (1265), a Castilian code of laws published under the patronage of Alfonso X.; and to this was added the *Libros de Astronomia* and the *Lapidaria*. The most notable of the Spanish poets of the 14th century was Juan Ruiz, arch-priest of Hita (1300-51), whose tales, interspersed with songs (*cantigas*), deal with the vices of his countrymen. Of the same burlesque character were the *Rimado de Palacio* of Pedro Lopez de Ayala (1332-1406), the *Proverbios Morales* of Santob the Jew, and a version of the Dance of Death. To this century belong the *Crónica de España*, compiled by order of Juan Fernandez de Heredia; and the authors of the prose chronicles of this period include Pedro de Ayala, Fernan de Guzman, Alfonso de Palencia, Fernando del Pulgar, and Andrés Bernaldes. Along with these historical chronicles may be mentioned the biographies of Pedro Nino, Alvara de Luna, Gonzalvo de Córdoba, and Ruy Gonzalez de Clavijo. In the 16th century there was published the *Amadis de Gaula*, the first of the Spanish *caballerias*, or 'books of chivalry,' and allied to it in character, but published later, were the *Amadis de Grecia*, *Don Florisando*, *Don Florisel de Niquea*, &c. At the court of Juan II. (1406-54), in Castile, the 'gaya ciencia' of the troubadours was established by Enrique, Marques de Villena, who was himself a translator of Virgil, and whose pupil, Lope de Mendoza, Marques de Santillana, wrote numerous sonnets and *serranillas*. It was not, however, until the kingdoms of Castile and Aragon were united under Ferdinand and Isabella that Spanish literature attained its chief distinction. This classic period, influenced by the Renaissance in Italy, found its first expression in numerous tercets, sonnets, and *canciones*, of which the principal writers were Juan Boscan Almogaver, Diego de Mendoza, Garcilaso de la Vega, Fernando de Herrera, and Hernando de Acuña. These innovators of the Petrarchian school were opposed by the rhymers of the old Castilian *redondillas*, chief among whom was Cristóbal de Castillejo. But more characteristic of this period was the vigorous development of the *novela*, with a picaroon or rogue for hero. The earliest of these *picaresque* novels

was the *Life of Lazarillo de Tormes*, by an unknown author; and this found imitation in the adventures of Guzman de Alfarache, by Mateo Aleman; Alonzo Mozo, by Geronimo de Alcantá; Gran Tacaño, by Quevedo; and numerous other romances. Yet these were all surpassed, and the chivalric extravagance of this period burlesqued to extinction by Don Quixote (first part 1605), the masterpiece of Miguel Cervantes de Saavedra. The position in popular favour occupied by the romance was claimed at the end of the 16th and beginning of the 17th century by the drama. From beginnings in the mediæval mystery plays it had developed through quasi-religious and wholly secular plays of an unimportant nature until the time of Lope de Vega (1562-1635). This writer, with his extraordinary fertility in production and facility in the invention of plot, added greatly to the scope and importance of the Spanish drama. Among the chief imitators and successors of Lope were Valez de Guevara, Gabriel Tellez (*Tirso de Molina*), and Juan Ruiz de Alarcón. But this movement received its full perfection and refinement in the poetical and philosophical dramas of Pedro Calderon de la Barca (1600-81). He also had followers and imitators, among whom may be mentioned Moreto, Solis, and Roxas de Castro. Among the historical writings of this era were the *Historia de España*, by Juan de Mariana; *Guerra de Granada*, by Diego de Mendoza; the *Historia Verdadera de la Conquista de la Nueva España*, by Bernal Diaz del Castillo; and the *Historia de las Indias*, by Bartolomé de las Casas. The mystics were represented by Avila, Santa Teresa, Ribadeneira, and Molina. With the decline in the greatness of the nation, however, there appeared a decadence in its literature. During the 18th century the drama lost all virility, while lyric poetry was largely represented by the artificial extravagances perpetuated by the imitators of Gongora (which see). But with the accession of the Bourbons there was introduced from France an element of revival into Spanish literature which was furthered by the Poetica of Ignacio de Luzan, the Reticora of Gregorio de Mayans, and the Teatro Critico of Benito Feyjoo. This French element had also its influence upon the poets of the latter half of the 18th and beginning of the 19th centuries, among whom were Valdes, Cienfuegos, Iriarte, Gonzales, Moratin, de la Rosa, &c.; while the romance was revived in the Fray

SPALATRO — SPANIEL.

Gerundio of José de Isla, who was also the translator of *Gil Blas*. The romantic movement of France had its Spanish adherents, among whom, as the most notable poets, are to be named Zorrilla, Espronceda, Diaz, Escosura, and Pacheco; the chief classicists being Quintana, Reinoso, Calderon, and Carvajal; while as a satirist, José de Lara (Figaro), and as a dramatist Manuel Breton de Herreros, are worthy of mention. More recently the poets Campoamor, Arce, Ferrari, Querol, the dramatist Echegaray, and the novelists Caballero, Pereda, Valera, Galdos, Trueba, Gonzales, and Alarcon have attained a certain distinction.

Spa'latro, or SPA'LATO, a seaport of Austria, in Dalmatia, situated on a bay of the Adriatic, 100 miles south-east of Zara. The whole town was at one time confined within the precincts of the vast palace, covering 8 acres of ground, built by the Emperor Diocletian, and of which many interesting and impressive remains are extant, and most of the buildings connected with it have been converted into private houses or public edifices. The manufactures include rosoglio and maraschino. Pop. 18,547.

Spalding, a market town, Lincolnshire, England, situated on the left bank of the Welland, 34 miles S.S.E. of Lincoln. It has an old and spacious church, with a fine tower and spire. The river has been made navigable to the town for vessels of from 50 to 70 tons burden. A large business is done in wool, corn, coal, and timber. Pop. 9385.

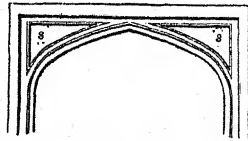
Spalding, WILLIAM, born at Aberdeen 1809, died 1859. He studied law, and was called to the bar in Edinburgh, but became professor of rhetoric at Edinburgh (1834-45), and subsequently professor of logic at St. Andrews. He was author of *Italy and the Italian Islands*, a brief but valuable *History of English Literature*, *Introduction to Logical Science*, and numerous articles in the *Encyclopædia Britannica*, the *Edinburgh Review*, *Blackwood's Magazine*, &c.

Spallanza'ni, LAZARO, born at Scandiano, Italy, in 1729; died 1799. In 1768 he was appointed to the chair of natural history at Pavia, and thenceforth devoted himself to experimental research. His writings include *Experiments on Animal Reproduction*; on *Infusory Animalcules*; on the *Phænomena of Circulation*; on *Animal and Vegetable Physics*; *Travels in the Two Sicilies*; on the *Transpiration of Plants*.

Spandau, a town in Brandenburg, Prussia, at the confluence of the Spree and Ha-

vel, about 8 miles N.W. of Berlin. It has now been made a fortress of the first class, and forms an important part in the general defences of the capital. The citadel, which is situated on an island in the Havel, contains the imperial military treasure of Germany. The town has manufactures of artillery and small-arms, gunpowder, woollen and linen cloth, &c. Spandau received municipal privileges in 1232. Pop. 70,301.

Spandrel, or SPANDRIL, in architecture, the irregular triangular space comprehended between the outer curve or extrados of an arch, a horizontal line drawn from its apex,



22, Spandrels.

and a perpendicular line from its springing; also a space on a wall, between the outer mouldings of two arches and a horizontal line, or string-course, above them; likewise between similar mouldings and the line of another arch rising above and inclosing the two. In Gothic architecture the spandrels are usually ornamented with tracery, foliage, &c.

Spangles, metal ornaments, used chiefly for theatrical dresses, and consisting for the most part of thin circular pieces of gilt or silvered tin.

Spaniel, the name of a group or subspecies of dogs characterized by great intelligence and an affectionate disposition, some varieties being also useful to the sportsman. The English water-spaniel is now almost extinct. The Irish water-spaniel is a fine animal of a dark rich liver or puce colour, with a crisp curly coat and a well-marked top-knot, and the large, pendulous ears characteristic of the race. A useful sporting variety is the short-legged Clumber spaniel, mostly lemon and white in colour, with long, silky, abundant hair. The Sussex spaniel differs from the Clumber chiefly in its golden-liver colour. The black field spaniel is a beautiful sporting dog which is now in great favour. The chief kinds of *toy* spaniels, all more or less pug-faced, are the King Charles (black and tan), the Ruby (chestnut red), the Blenheim (red and white), the Prince Charles (black, tan, and white), and the Japanese (black,

red, or lemon on white). The Maltese dog is a kind of spaniel.

Spanish-broom, a plant of the genus *Spartium*, the *S. junceum*, allied to the common broom, but of more rush-like growth. It has been cultivated in British gardens for upwards of 300 years, bearing handsome yellow flowers. A good fibre is obtained from the macerated twigs, which is made into thread, cord, and a coarse sort of cloth in some of the Mediterranean countries.

Spanish-brown, a species of earth used in painting, having a dark reddish-brown colour, which depends upon the sesquioxide of iron.

Spanish-elm, an evergreen tree of Mexico and the West Indies, yielding a tough elastic wood of a fine grain (*Cordia gerasacanthus*).

Spanish Fly. See *Cantharides*.

Spanish Language and Literature. See *Spain*.

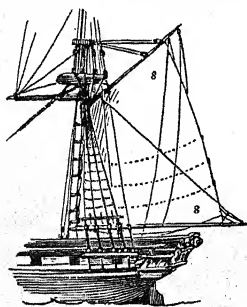
Spanish Main, the name formerly given to the Atlantic Ocean and coast along the north part of South America, from the Leeward Islands to the Isthmus of Darien.

Spanish Succession, WAR OF THE. See *Succession Wars*.

Spanish Town, or SANTIAGO DE LA VEGA, a town, Jamaica, on the south side of the island, about 12 miles north-west of Kingston. It was formerly the seat of government, but that has now been transferred to Kingston. Pop. 6000.

Spanish-white, originally a white earth from Spain, used in painting; at present, a pigment prepared from chalk which has been separated in an impalpable form by washing.

Spanker, a large fore-and-aft sail set upon



S.S. Spanker.

the mizzen-mast of a ship or barque, the top extended by a gaff, the foot by a boom. It is also called the *driver* or *mizzen*.

Span-worm, a name frequently given in the United States to certain caterpillars, of which the canker-worm is an example.

Spar, in mineralogy, a term employed to include a great number of crystallized, earthy, and some metallic substances, which easily break into rhomboidal, cubical, or laminated fragments with polished surfaces, but without regard to the ingredients of which they are composed. Among miners the term spar is frequently used alone to express any bright crystalline substance.

Spar-deck, nautical, a term somewhat loosely applied, though properly signifying a temporary deck, consisting of spars supported on beams, laid in any part of a vessel. It also means the quarter-deck, gangways, and fore-castle of a deep-waisted vessel, and is applied to the upper entire deck of a double-banked vessel without an open waist.

Sparidae, a family of acanthopterygious, teleostean fishes, of which the genus *Sparus* is the type. They somewhat resemble the perches in form, the body being generally of an ovate form and covered with large scales. The Sparidae are mostly inhabitants of warm climates. They are edible, and some of them highly esteemed. British examples are the gilthead (*Chrysophrys aurata*) and the seabream (*Pagrus Centrodontus*).

Spark, ELECTRIC, a discharge of electricity which is accompanied with light and violence. See *Electricity*.

Sparks, JARED, born at Willington, Connecticut, 1789; died 1866. He was educated at Harvard, where he became mathematical tutor, and he was subsequently (1819-23) pastor of a Unitarian church at Baltimore. He was afterwards editor of the North American Review, and was appointed professor of history (1839) and president (1849) of Harvard. He is chiefly known in literature as the author of *Life and Writings of Washington* (twelve vols., 1834-37); *Diplomatic Correspondence of the American Revolution* (twelve vols., 1829-30); *Library of American Biography* (two series, 25 vols.); and *Works of Benjamin Franklin* (ten vols., 1836-40).

Sparrow, a well-known bird of the finch family (*Passer* or *Pyrgita domestica*), which inhabits the British Islands and other parts of Europe, and has been introduced into North America and Australia. Their amazing fecundity, their strong attachment to their young, their familiarity, not to say impudence, and their voracity, are familiar

SPARROW-HAWK — SPARTA.

to all. They often do great injury in corn-fields and gardens, but they also do great service in destroying grubs, caterpillars, &c. The tree sparrow (*P. montana*), the only other British species, is also very widely distributed. It very closely resembles the common sparrow, but is of smaller size. For the hedge-sparrow, see *Hedge Warbler*. Certain members of the family Emberizidæ or buntings, are called 'sparrows' in America.

Sparrow-hawk, the common name of several hawks, one of which is well known in Britain, the *Accipiter nisus*, or *Nisus fringillarius*, about 12 inches in length. The male is coloured dark brown on the top of the head, and on the upper aspect of the body



Sparrow-hawk (*Accipiter nisus*).

and wings. The under parts are of a reddish-brown colour, marked with narrow bands of darker tint. The female bird is of a duller brown hue on the back and head; and her plumage is diversified by numerous white spots. It is a bold, active bird, very destructive to pigeons and small birds. The sparrow-hawk of Australia (*A. torquatus*) is marked by a collar of numerous bars of white. Its habits are very similar to those of the European sparrow-hawk. The American sparrow-hawk is the *Falco sparverius*. It is similar in size to the European sparrow-hawk, but rather allied to the kestrel. It often preys on the chickens in poultry-yards.

Sparta, or **LACEDÆMON** (now *Sparti*), a celebrated city of ancient Greece, the capital of Laconia and of the Spartan state, and the chief city in the Peloponnesus, lay on the west bank of the river Eurotas, and embraced a circuit of 6 miles. Sparta was a scattered city consisting of five separate quarters. Unlike Athens it was plainly

built, and had few notable public buildings; consequently there are no imposing ruins to be seen here as in Athens, and the modern Sparta is only a village of some 4000 inhabitants. **LACONIA**, the district in which Sparta was situated, was the south-eastern division of the Peloponnesus, bounded on the west by Messenia, from which it was separated by the chain of Taygetus, on the north by Arcadia and Argolis, and on the east and south by the sea. The Eurotas (Vasilopotamo, 'king of rivers') here flows through a picturesque valley and empties into the Gulf of Laconia. The Spartan state was founded, according to tradition, by Lacedæmon, son of Zeus. The most celebrated of its legendary kings was Menelaus. It is said to have been conquered by the Heraclidæ from Northern Greece about 1080, who established a dyarchy or double dynasty of two kings in Sparta. Apart from this legend it is accepted as a historical fact that the Spartans were the descendants of the Dorians who invaded the Peloponnesus about that period, and that from an early period they followed a set of rigorous laws which they ascribed to Lycurgus. Shortly after their settlement in the Peloponnesus it is probable that the Spartans extended their sway over all the territory of Laconia, a portion of the inhabitants of which they reduced to the condition of slaves (Helots). They also waged war with the Messenians, the Arcadians, and the Argives, against whom they were so successful that before the close of the 6th century B.C. they were recognized as the leading people in all Greece. Early in the following century began the Persian wars, in which a rivalry grew up between Athens and Sparta. This rivalry led to the Peloponnesian war, in which Athens was humiliated and the old ascendancy of Sparta regained. (See *Greece*.) Soon after this the Spartans became involved in a war with Persia, by joining Cyrus the Younger in his rebellion against his brother Artaxerxes Mnemon (401), but Athens, Thebes, Corinth, and some of the Peloponnesian states, took this opportunity to declare war against the Lacedæmonians. The latter defeated the Thebans at Coronea (394); but, on the other hand, the Athenian commander Conon gained a victory over the Spartan fleet at Cnidus. This war, known as the Boeotian or Corinthian war, lasted eight years, and increased the reputation and power of Athens. To break the alliance of Athens with Persia, Sparta, in 387 B.C.,

concluded with the latter power the peace known by the name of Antalcidas; and the designs of Sparta became apparent when she occupied, without provocation, the city of Thebes, and introduced an aristocratical constitution there. Pelopidas delivered Thebes, and the celebrated Theban war (378-363) followed, in which Sparta was much enfeebled. During the following century Sparta steadily declined, although one or two isolated attempts were made to restore its former greatness. The principal of these was made by Cleomenes (236-222), but his endeavours failed, because there were then scarcely 700 of Spartan descent, and the majority of these were in a state of beggary. With the rest of Greece Sparta latterly passed under the dominion of the Romans in 146 B.C.

The Spartans differed from the other Greeks in manners, customs, and constitution. Their kings (two of whom always reigned at once) ruled only through the popular will, acting as umpires in disputes, and commanding the army. The Spartans proper, that is, the descendants of the Dorians, occupying themselves with war and the chase, left all ordinary labour to the Helots, while the class known as Perieci (descendants of the ancient inhabitants of the country) engaged in commerce, navigation, and manufactures. The distinguishing traits of the Spartans were severity, resolution, and perseverance, but they were also accounted faithless and crafty. When a child was born, if it proved vigorous and sound the state received it into the number of citizens, otherwise it was thrown into a cave on Mount Taygetus. To accustom the children to endure hunger they gave them but little food; if they stood in need of more they were obliged to steal it; and if discovered, they were severely punished. They wore no outer garment except in bad weather, no shoes at any time, and they were obliged to make their beds of rushes from the Eurotas. The principal object of attention during the periods of boyhood and youth was physical education, which consisted in running, leaping, throwing the discus, wrestling, boxing, the chase, &c. A singular custom was the flogging of boys on the annual festival of Artemis Orthia, for the purpose of inuring them to bear pain with firmness. Whoever uttered the least cry during the scourging, which was so severe as sometimes to prove fatal, was considered as disgraced, while he who bore it without shrinking was crowned. The Spartans were the

only people of Greece who avowedly despised learning, and excluded it from the education of youth. The education of the Spartan females was also different from that of the Greeks elsewhere. Instead of remaining at home, as in Athens, spinning, they danced in public, wrestled with each other, ran on the course, threw the discus, &c.

Spartacus, a Thracian gladiator, the instigator and leader in a revolt of the slaves in Italy (the Servile war) in 73-71 B.C. He had been compelled, like other barbarians, to serve in the Roman army, from which he had deserted. Being made prisoner Spartacus was sold as a slave, and placed in a gladiatorial school at Capua with 200 other Thracian, German, and Gaulish slaves. There they formed a conspiracy and effected their escape; and being joined by the disaffected slaves and peasantry of the neighbourhood, in a few months Spartacus found himself at the head of 60,000 men. Two consuls were now sent with armies against him, but Spartacus defeated them in succession and led his elated forces towards Rome. In this crisis Licinius Crassus, who was afterwards a triumvir, was placed at the head of the army, and managed to hem in the revolted slaves near Rhegium. Spartacus broke through the enemy by night, and retreated, but latterly had to encounter the army of Crassus. His soldiers fought with a courage deserving success; but they were overcome after an obstinate conflict, and Spartacus himself fell fighting.

Spartel, CAPE, a promontory situated on the N.W. coast of Morocco, at the entrance to the Straits of Gibraltar, and in height about 1000 feet above the sea.

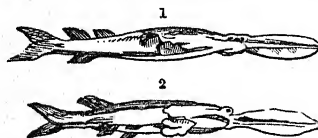
Spasm, in medicine, an abnormal, sudden, and more or less violent contraction of one or more muscles or muscular fibres. Spasm is either *clonic* or *tonic*. In *clonic spasm* the muscles or muscular fibres contract and relax alternately in very quick succession, producing the appearance of agitation, as in epilepsy. In *tonic spasm* the muscles or muscular fibres contract in a steady and uniform manner, and remain contracted for a comparatively long time, as in tetanus.

Spatan'gus, a genus of sea-urchins, otherwise called 'heart-urchins' from their shape. The species are numerous.

Spathe, in botany, a large membranaceous bract situated at the base of a spadix, which it incloses as a sheath. It is seen in the greatest perfection in the palms and arums. See *Spadix*.

Spat'ula, a flat sort of knife with a thin flexible blade, used by druggists, painters, &c., for spreading plasters, working pigments, &c. In surgery, it is a flat instrument, angular or straight, for depressing the tongue and keeping it out of the way in operations about the throat or larynx.

Spatularia, or **POLYODON**, a genus of fishes belonging to the sturgeon tribe. They are



Spatularia, upper (1) and under (2) view.

remarkable for the form of their snouts, which are enormously long and leaf-like in form. The type of the genus is the paddle-fish of the Mississippi.

Spav'in, a disease of horses, affecting the hock-joint, or joint of the hind leg, between the knee and the fetlock. It occurs in two forms. In the first, which is called bog or blood spavin, the joint is distended by joint-oil (synovia). In the other form there is a morbid deposition of bony substance, such as to unite separate bones.

Spawn, the eggs or ova of fishes, frogs, &c., from which, when fertilized by the males, a new progeny arises that continues the species. In the oviparous fishes with distinct sexes the eggs are impregnated externally, and arrive at maturity without the aid of the mother. The spawn being deposited by the female, the male then pours upon it the impregnating fluid. In the ovoviviparous fishes sexual intercourse takes place, and the eggs are hatched in the uterus. Fishes exhibit a great variety in regard to the number of their eggs. In the spawn of a cod-fish, for example, no fewer than three and a half millions of eggs have been found. In general, before spawning, fish forsake the deep water and approach the shore, and some fish leave the salt water and ascend the rivers before spawning, and then return again. See *Reproduction*.

Speaker, a person who presides over a deliberative assembly, preserving order and regulating the debates. The speaker of the British House of Commons is a member of the house, elected by desire of and with the approbation of the crown to act as chairman or president, in putting questions, reading bills, keeping order, controlling the debates

of the house, &c. He is not to deliver his sentiments upon any question, or give his vote, except in a committee or in case of an equality of votes, when he has the privilege of giving a casting-vote. He is a member of the privy-council, and ranks after the barons. He has a salary of £5000 a year, with a free residence. On vacating his office he is made a peer, and receives a pension of £4000. The lord chancellor, or the keeper of the great seal, is speaker of the House of Lords *ex officio*. He can speak and vote on any question.

Speaking Trumpet, an instrument used for conveying the sound of the voice to a distance. It consists of a hollow piece of metal, or other material, of a nearly conical form, open at both ends, and slightly turned out at the narrow end to form a mouth-piece.

Spear, a long pointed weapon used in war and hunting, by thrusting or throwing; a lance. See *Lance*, *Pike*.

Spearmint (*Mentha viridis*), a European and North American species of mint often cultivated for making sauce and in order to obtain a flavouring essence from it.

Spear-thistle, a common British thistle, the *Cnicus lanceolatus*. It grows on waysides and in pastures. The leaves are downy beneath, and their points long and very sharp, and it has handsome heads of purple flowers.

Spearwort, a plant of the genus *Ranunculus*. The great spearwort is the *R. lingua*, and the lesser spearwort is the *R. flammula*. Both are British plants, with lanceolate undivided leaves and yellow flowers, growing in wet localities.

Special Case, a statement of facts agreed to on behalf of two or more litigant parties, and submitted for the opinion of a court of justice as to the law bearing on the facts so stated.

Special Jury, in England, a jury specially asked for by either party in an action, consisting of men who have a certain status in society, being esquires, bankers, merchants, or the like. The party asking the jury is liable for the expense of it.

Special License. See *Marriage*.

Special Pleader, a member of one of the Inns of Court whose professional occupation it is to give verbal or written opinions on matters submitted to him, and to draw pleadings, civil and criminal, and such practical proceedings as may be out of the usual course.

Species, as ordinarily defined, is any one group of animals or plants the members of which generally bear a close resemblance to each other in the more essential features of their organization, which produce fertile progeny, and which may, in the generality of cases, produce individuals varying from the general type of the group, the variation, however, being in all cases of a limited kind. Under this definition the various species, 'kinds' of animals and plants, and their included varieties, used to be comprehended, while naturalists regarded species as unchanging throughout the longest succession of ages, except within narrow and marked limits. Thus Buffon defines a species as 'a constant succession of individuals similar to and capable of reproducing each other;' and Cuvier as 'a succession of individuals which reproduces and perpetuates itself.' Since the publication, however, of Darwin's Origin of Species this conception has been greatly modified by the view that, as Haeckel defines it, 'the species is the whole succession of organisms which exhibit the same form in the same environment.' In this conception no absolute standard of what constitutes a species can be set up, nor can the number of species, especially among the transitional varieties of the lowest forms of life, be determined. In mineralogy, chemistry, and such sciences as relate to inorganic substances, species is regarded by some writers as being determined by identity of physical properties, as specific gravity, hardness, &c.; and by others, as constituted by chemical composition, the physical properties going for nothing. In scientific classification species unite to form groups called genera, which are included in orders, the orders forming classes, and so on.—Species in logic is a group of individuals agreeing in common attributes and designated by a common name; a conception subordinated to another conception, called a genus or generic conception, from which it differs in containing or comprehending more attributes, and extending to fewer individuals; thus 'man' is a *species* under 'animal' as a *genus*, and 'man' in its turn may be regarded as a *genus* with respect to European, Asiatic, and the like.

Specific Gravity, is the relative gravity or weight of any body or substance considered with regard to an equal bulk of some other body which is assumed as a standard of comparison. The standard for the specific gravities of solids and liquids is pure

distilled water at the temperature of 62° Fahr., which is reckoned unity. By comparing the weights of equal bulks of other bodies with this standard we obtain their specific gravities. Thus the specific gravity of cast-iron is 7.21; that is, any particular mass of cast-iron will weigh 7.21 times as much as an equal bulk of water. The practical rule is, weigh the body in air, then in pure distilled water, and the weight in air divided by the loss of weight in water will give the specific gravity of the body. In stating the specific gravities of gases the standard is atmospheric air, or now commonly hydrogen. See *Hydrometer*.

Specific Heat is a term applied to the quantity of heat required to raise equal weights of different substances through equal intervals of temperature. Water is taken as the standard substance in measuring quantities of heat. The thermal capacity of unit mass of cold water is unity; and the number which denotes the thermal capacity of a body expresses the mass of water which has the same thermal capacity as the body. Thus the thermal capacity of unit mass of a substance is called its *specific heat*, and is identical with the ratio of the thermal capacity of any mass of the substance to that of an equal mass of water. The specific heats of the metals and of many other substances have been carefully determined, and are tabulated in all the larger books on heat.

Spectacled Bear (*Tremarctos ornatus*), the sole representative of the bears in South America, inhabiting the high mountain forests of Chili and Peru. So called from the light-coloured rings round the eyes having exactly the appearance of a pair of spectacles; the rest of the face and body being black.

Spectacles, a well-known and invaluable optical instrument supposed to have been invented by Roger Bacon in the 13th century, and used to assist or correct some defect in the organs of vision. Spectacles consist generally of two oval or circular lenses mounted in a light metal frame which is made up of the 'bows,' 'bridge,' and 'sides.' The lenses are usually bi-concave, bi-convex, or concavo-convex, though lenses forming segments of a cylinder are used in some cases of astigmatism. In long-sighted persons the defect of the eye is counteracted by convex lenses, in short-sighted persons by concave lenses. (See *Sight*.) *Divided spectacles* have each lens composed of two semi-

circles of different foci neatly united one above the other; one half for looking at distant objects, and the other for examining things near the eye. Another kind, called *periscopic spectacles*, has been contrived in order to allow considerable latitude of motion to the eyes without fatigue. The lenses employed in this case are either of a meniscus or concavo-convex form, the concave side being turned to the eye.

Spectator, a London weekly periodical founded in 1828 as a 'Liberal Review.' Its news is given in paragraph articles, and its original articles on politics, literature, and art are written in a cautious and thoughtful spirit.

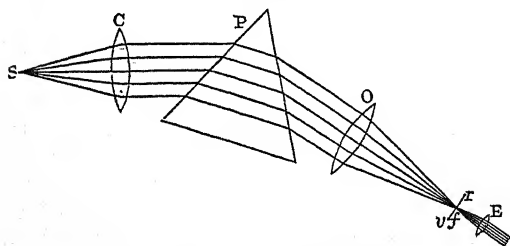
Spectre-bats (*Phyllostomidae*), a family of insectivorous Chiroptera, which have a simple and fleshy leaf-like appendage to the nose, and a fore-finger of two joints. They attain to a considerable size, and the family comprises the vampire-bats (which see).

Spectroscope, the instrument employed in spectrum analysis. (See *Spectrum*.) It usually consists of the following parts: 1st, a tube with a narrow slit at one end, and a convex lens at the other, from which parallel rays of light proceed when light is made to pass through the slit, the two form-

Spectrum, a series or band of colours obtained when light is transmitted through a glass prism. A spectrum is usually obtained by sunlight or artificial light passing through a narrow slit and then through a prism. (See *Light*.) The spectrum is coloured throughout its length, the colours shading insensibly into one another from red at the one end, through orange, yellow, green, blue, indigo, to violet at the other. These colours are due to the different constituents of which solar light is made up, and the stripe seen is formed by an indefinite number of images of the slit ranged in order and partially overlapping. The analysis or decomposition of the beam is due to the different refrangibilities of the component rays, the violet being the most refrangible and the red the least. Besides the coloured rays, the spectrum contains thermal or heating rays, and chemical or actinic rays which are not visible to the eye. The heating effect of the solar spectrum increases in going from the violet to the red, and still continues to increase for a certain distance beyond the visible spectrum at the red end, while the chemical action is very faint in the red, strong in the blue and violet, and sensible to a considerable distance beyond the violet end. The actinic rays

beyond the violet may be rendered visible by throwing them upon a surface treated with some fluorescent substance. A pure spectrum of solar light is crossed at right angles by numerous dark lines, called *Fraunhofer's lines*, each dark line being invariable in position. The figure shows the positions of the most conspicuous of these fixed lines, and the letters above them are the names by which they

are known, being those assigned to them by the discoverer Fraunhofer. For the proper understanding of the import of these lines, five principles require to be kept in view. *First*, an incandescent solid or liquid body gives out a *continuous* spectrum. *Second*, an incandescent gaseous body gives out a *discontinuous* spectrum, consisting of bright lines. *Third*, each element when in the state of an incandescent gas gives out lines peculiar to itself. *Fourth*, if the light of an incandescent solid or liquid passes through a gaseous body, certain of its rays are absorbed, and black lines in the spectrum indicate the nature of the sub-



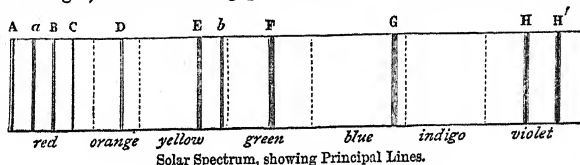
Arrangement of Parts in Spectroscope.

ing together what is called the *collimator*. 2d. A prism of dense flint-glass on which the rays fall after emerging from the collimator. 3d. An observing telescope so placed that the rays traverse it after emerging from the prism. The accompanying figure gives a ground plan of the arrangement: *s* is the slit, *c* the collimating lens, *P* the prism, *o* the object-glass of the telescope, and *E* the eyepiece. An image of the slit will be formed at *f* by rays of given refrangibility, others between *f* and *v* by rays of greater refrangibility, and others between *f* and *r* by rays of less refrangibility, thus giving a complete spectrum.

SPECTRUM ANALYSIS—SPEECH.

stance which absorbed the ray. *Fifth*, each element, when gaseous and incandescent, emits bright rays identical in colour and position on the spectrum with those which it absorbs from light transmitted through it. The spectrum of sodium, for instance, shows two bright lines which correspond in position with the double black line at D (the *sodium line*) shown in figure. Now, applying these principles to the solar spectrum, we find, from the nature and position of the rays absorbed, that its light passes through hydrogen, potassium, sodium, calcium, barium, magnesium, zinc, iron, chromium, cobalt, nickel, copper, and manganese, all in a state of gas, and constituting part

of the solar envelope, whence we conclude that these bodies are present in the substance of the sun itself, from which they have been volatilized by heat. The moon and planets have spectra like that of the sun, because they shine by its reflected light, while, on the other hand, each fixed star has a spectrum peculiar to itself. It has been already said that the incandescent vapour of each elementary substance has a characteristic spectrum, consisting of fixed lines, which never changes. This furnishes the chemist with a test of an exquisitely delicate nature for the detection of the presence of very minute quantities of elementary bodies. Thus, by heating any substance till



it becomes gaseous and incandescent and then taking its spectrum, he is able from the positions of the lines to determine which special elements are present in the substance. Several new elements, as rubidium, caesium, indium, thallium, and helium, have thus been detected. See *Spectroscope*.

Spectrum Analysis. See *Spectrum*.

Speculum, in optics and astronomy, a reflecting surface, such as is used in reflecting telescopes, usually made of an alloy of copper and tin (see *Speculum Metal* below), but frequently now of glass. Those of glass are covered with a film of silver on the side turned toward the object, and must not be confounded with mirrors, which are coated with tin-amalgam on the posterior side.—In surgery the name is given to an instrument used for dilating any passage, as the ear, or parts about the uterus, with a reflecting body at the end, upon which a light being thrown the condition of the parts is shown.

Speculum Metal, metal used for making the specula of reflecting telescopes. It is an alloy of two parts of copper and one of tin, its whiteness being improved by the addition of a little arsenic.

Spedding, JAMES, born near Bassen-thwaite, in Cumberland, 1808; died from the effects of a cab accident, 1881. He was educated at Bury St. Edmunds and Trinity College, Cambridge, graduated in 1831, and was long an honorary fellow of his college.

In 1847 he undertook, with the collaboration of Mr. R. L. Ellis and Mr. D. D. Heath, to prepare a complete edition of Bacon's works; but the former died while the task was unfinished, and the latter only gave occasional assistance. The work, therefore, was almost entirely left to Spedding, who completed and published his labours in seven volumes (1857-61). This done, he published *The Life and Letters of Bacon* (seven vols., 1862-74), and *Reviews and Discussions, Literary, Political, and Philosophical*, not relating to Bacon, *Evenings with a Reviewer*, and *Studies in English History*.

Speech, spoken language; uttered sounds intended to convey meaning, and produced by the organs of voice, namely, the larynx, and the mouth and its parts, including the tongue and teeth. In speech two great classes of sounds are produced, these being usually known as *vowels* and *consonants*. Vowels are pronounced by sounds coming primarily from the larynx and passing with comparative freedom through the mouth cavity, though modified in certain ways; while consonants are formed by sounds caused by the greater or less interruption of the current of air from the larynx in the mouth. Vowels can be uttered alone and independently of consonants, and their sounds can be prolonged at will; consonants have no importance in speech as apart from vowels, and are named consonants from being used

along with vowels. Both vowel and consonant sounds are very numerous if we investigate the different languages of the world, but any one language only has a fraction of those that may be used. A single sound may convey an idea of itself and thus form a word, or several may be combined to form a word, and if the word is uttered by several distinct successive changes in position of the vocal organs it is a word of so many syllables. Words, again, are combined to form sentences or complete statements, and the aggregate of words used by any people or community in mutual intercourse forms its language. See *Philology, Voice, Vowel, Consonant, &c.*

Speedwell, the common name of plants of the genus *Veronica*, nat. order Scrophulariaceæ, natives of temperate climates all over the world. The species consist of herbs,



Germander Speedwell (*Veronica Chamædrys*).

undershrubs, or shrubs, with opposite, alternate, or verticillate leaves. The flowers are of a blue, white, or red colour, having two stamens, and are arranged in axillary or terminal spikes or racemes. The number of British species is considerable. *V. officinalis*, or common speedwell, was once extensively used as a substitute for tea, and also as a tonic and diuretic. *V. Teucrium*, or germander-leaved speedwell, has much the same properties as common speedwell, and *V. Chamædrys*, or germander speedwell, is a very general favourite, on account of its being among the very first that opens its flowers in the early spring.

Speke, JOHN HANNING, English traveller, born 1827; died from a gun-shot accident, 1864. In 1844 he obtained a commission in the 46th Regiment of Bengal Native

Infantry, and took part in the war of the Punjab. In 1854 he accompanied Burton's party in their expedition to Somali Land, and was wounded in that disastrous affair. In 1857 Speke and Burton again set out, directed by the Royal Geographical Society, their object being to ascertain the position of the great lakes of the interior. The great lake Tanganyika was discovered, and Burton falling sick, Speke proceeded north and discovered the south end of the Victoria Nyanza. For this discovery he was awarded the gold medal of the Royal Geographical Society. In 1862, accompanied by Captain Grant, he explored the western and northern margin of the lake, and found a river flowing north and out of the lake, which proved to be the White Nile. His discoveries and adventures were described by him in his *Journal of the Discovery of the Sources of the Nile* (1863) and *What Led to the Discovery of the Sources of the Nile* (1864).

Spelt (*Triticum spelta*), an inferior kind of wheat, grown in various parts of Europe, and known also as German wheat.

Spelter, a name often applied in commerce to zinc.

Spence, WILLIAM, English naturalist, born 1783, died 1860. The observation of the habits of animals, more especially insects, early formed a favourite pursuit with him. Having made the acquaintance of the distinguished entomologist Mr. Kirby, the result was the joint production of the well-known *Popular Introduction to Entomology*. The first volume of this work appeared in 1815, and it was subsequently completed in four volumes in 1826. Mr. Spence was at one time in business at Hull; latterly he resided in London.

Spencer, GEORGE JOHN, EARL, son of the first Earl Spencer, was born in 1758, died in 1834. He was educated at Harrow, and Trinity College, Cambridge. When he had completed his education he travelled, and on his return was elected member of parliament for the county of Northampton. In 1789, by his father's death, he became Earl Spencer. In the House of Lords he voted with the Whigs till the period of the French revolution, when he joined the party of Pitt, and was for some time a member of the Pitt administration. Earl Spencer was president of the Roxburghe Club at its origination, and possessed the largest and richest private library in the world. A catalogue of the rarest and most costly works of the collec-

tion was prepared by Dibdin—Bibliotheca Spenceriana, &c. The great 'Althorp Library' was finally sold to Mrs. Rylands of Manchester (1892), and forms part of the Rylands Library there (opened 1899).

Spencer, HERBERT, English philosopher, born at Derby 1820; educated by his father, a teacher of mathematics, and his uncle, a clergyman; was apprenticed as a civil engineer, and worked several years on railways; contributed several professional papers to the Civil Engineer and Architect's Journal, besides a series of letters in 1842, on the Proper Sphere of Government, to The Nonconformist; became in 1848 sub-editor of The Economist; published Social Statics (1850). About the year 1859 he projected his Scheme of Philosophy, based on the principle of evolution in its relation to life, mind, society, and morals. This extensive scheme was latterly completely expounded in the following works:—First Principles (1862; new ed., 1900); Principles of Biology (2 vols., 1867; new ed., 1898-99); Principles of Psychology (2 vols., 1872), a revised form of a work published in 1855; Principles of Sociology (3 vols., 1877-96); and Principles of Ethics (2 vols., 1892-93). Portions of this great work are known under separate titles, as Data of Ethics (1879); Ceremonial Institutions (1879); Political Institutions (1882); Ecclesiastical Institutions (1885), &c. His other works include Education (1861); Essays: Scientific, Political, and Speculative (3 vols., 1892); Classification of the Sciences (1864); The Study of Sociology (1873); Man versus the State (1884); Facts and Comments (1902); and an Autobiography (2 vols., 1904). He published also an elaborate Descriptive Sociology compiled by other writers, but classified and arranged by himself. He died in 1903.

Spencer Gulf, an extensive inlet of South Australia; length about 200 miles, breadth at widest about 90 miles, and at inner extremity about 3 miles.

Spener, PHILIPP JAKOB, German Lutheran divine, born 1635, died 1705. In 1651 he commenced his theological studies at Strasburg, became in 1654 tutor to the Princess of the Palatinate, and delivered lectures on philosophy and history. In 1664 he was made doctor of theology at Strasburg, and in 1666 he received the office of senior clergyman at Frankfort-on-the-Main. In 1670 he instituted his celebrated *collegia pietatis*, which, against his will, became the origin of

pietism. From 1686 to 1691 he was preacher to the court in Dresden. He went in 1691 to Berlin, and he took an active part in the foundation of the University of Halle. See *Pietism*.

Spenser, EDMUND, English poet, was born in London about 1552, and was probably descended from the Spensers of Hurstwood, Lancashire. He was admitted as a sizar of Pembroke Hall, Cambridge, on the 20th of May, 1569, graduated as B.A. in 1573, and as M.A. in 1576. On leaving the university he is thought to have resided in the north of England, where he unsuccessfully wooed a lady, whom he celebrates under the name of Rosalinde in his Shepherd's Calendar, published in 1579. The year before he had gone to London, where he was introduced to Sir Philip Sidney, to whom he dedicated this poem. In 1580 he was appointed, through the influence of Sidney, secretary to Lord Grey de Wilton, lord-lieutenant of Ireland, and became clerk of degrees and recognizances in the Irish Court of Chancery. In 1586 Lord Grey, in conjunction with the Earl of Leicester and Sir Philip Sidney, procured for him a grant of upwards of 3000 acres in the county of Cork, out of the forfeited lands of the Earl of Desmond. He accordingly fixed his residence at Kilcolman, in the county of Cork, about 1588, in which year he resigned his clerkship in the Court of Chancery. In 1588 he was appointed clerk of the council of Cork, and in the following year received a visit from Sir Walter Raleigh, who, since the death of Sidney in 1586, had become his most intimate friend. He was then engaged in the composition of the Faerie Queene, of which he had written the first three books. With these he accompanied Raleigh the next year to England, where they were published in 1590, with a dedication to Queen Elizabeth. Raleigh also gained him the favour of the queen, who rewarded his poetry and dedication with a pension of £50. It was probably in the same year that the Daphnida was first published, and it is certain that before the close of that year Spenser was again at Kilcolman. He then passed an interval of two or three years in Ireland, where, in 1594, he married. The courtship is celebrated by him in eighty-eight sonnets, and its consummation in his Epithalamium. In 1595 he paid another visit to London, and published various volumes such as Colin Clout's Come Home Again, and Astrophel and The Mourning Muse of Thestylis; his

SPENSERIAN STANZA — SPERM WHALE.

sonnets and Epithalamium in one volume; the fourth, fifth, and sixth books of the Faerie Queene, together with a new edition of the first three books; his Prothalamium or Spousal verse on the marriages of the Ladies Elizabeth and Catharine Somerset; and Four Hymns in Honour of Love, of Beauty, of Heavenly Love, and of Heavenly Beauty, together with a reprint of his Daphnida and Epithalamium. It was probably also during this visit that he drew up his View of the State of Ireland, which was presented to Queen Elizabeth, but which lay in MS. until printed, in 1683, by Sir James Ware. In 1597 Spenser returned to Ireland, and in September 1598 he was appointed sheriff of the county of Cork. The rebellion of Tyrone, however, took place in October, and Spenser's house was fired by the populace, and his infant child perished in the flames. The poet arrived in England with body and spirit broken by these misfortunes, and died the following January, 1599. He was interred in Westminster Abbey at the expense of the Earl of Essex, where a monument was afterwards erected by the celebrated Anne, countess of Dorset. As a poet, although his minor works contain many beauties, Spenser will be judged chiefly from the Faerie Queene. In the full title the poem is described as 'disposed in twelve books fashioning twelve moral virtues,' and six of these were published, besides two cantos on Mutability first published in 1611. It is supposed that part of the unfinished poem may have perished when the poet's house was sacked and burned.

Spenserian Stanza, the stanza adopted by Edmund Spenser in his Faerie Queene. It consists of a strophe of eight decasyllabic lines and an Alexandrine, and has a three-fold rhyme, the first and third lines forming one, the second, fourth, fifth, and seventh another, and the sixth, eighth, and ninth the third. It is the stateliest of English measures, and was adopted by Byron in his Childe Harold.

Sper'gula, a genus of plants, natural order *Caryophyllaceae*. See *Spurrey*.

Spermace'ti, a fatty material obtained chiefly from cavities in the skull of the sperm whale (which see). During the life of the animal the spermaceti is in a fluid state, being dissolved in the oily liquid which is found when the head of the whale is opened. On exposure to the air the spermaceti solidifies, and separates from the oil. Some of the larger whales have been

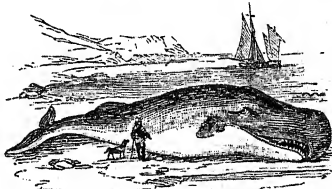
known to yield twenty-four barrels of spermaceti, and from seventy to a hundred barrels of oil. After purification by thorough pressing and treatment with a little potash, it forms white, brittle, semi-transparent crystals. Spermaceti is now used as an ingredient in ointments and salves, but mainly for the manufacture of candles. For this purpose it is usually mixed with small amounts of other waxes to render the candles less brittle.

Spermatozo'a, the microscopic animalcule-like bodies developed in the semen of animals, each consisting of a body and a vibratile filamentary tail, exhibiting active movements comparable to those of the ciliated zoospores of the algae, or the ciliated epithelial cells of animals. Spermatozoa are essential to impregnation.

Sperm-oil, the oil of the spermaceti whale, which is separated from the spermaceti and the blubber. (See *Spermaceti*.) This kind of oil is much purer than train-oil, and burns away without leaving any charcoal on the wicks of lamps. In composition it differs but slightly from common whale-oil.

Spermoph'ilus, the name of a genus of rodentia, common in N. America, where they are known generally as *gophers* and *ground-squirrels*. Eastern Europe produces one species, *S. citillus*, called also the *suslik*.

Sperm Whale, or **CACHALOT** (*Physeter macrocephalus*), a species of cetacea belonging to the section of the whale order denominated 'toothed' whales, generally met



Sperm Whale (*Physeter macrocephalus*).

with in the Pacific, but occasionally also on the coast of Greenland. The large blunt head in an old male is sometimes 30 feet long, and forms about a third of the total length of the body; whilst the 'blow-holes' or S-shaped nostrils are situated in the front part of the head. The weight of an adult animal is estimated at about 200 tons, and in a male 66 feet long the flipper measured 5 feet 3 inches, and the two-lobed tail-fin

had a breadth of nearly 20 feet. The top of the back is continued almost in a straight line from the upper part of the head; the belly is enormous, but the body thins off towards the wide tail. The colour is a blackish-gray, which may exhibit greenish or bluish hues on the upper parts. The teeth of the lower jaw average each about 3 inches in length. This whale is of considerable commercial value. See *Spermoceti*.

Spey (spā), a river in Scotland, issues from a lake of the same name in Inverness-shire, between Loch Laggan and Loch Lochy, flows north-east through the beautiful valley of Strathspey, forming in part of its course part of the boundary between the counties of Elgin and Banff, and falls into the Moray Firth a little below Garmouth, after a course of about 96 miles. It has a very rapid course, is used for floating down timber, and is noted for its salmon fisheries.

Speyer, or SPEIER (spî'ér). See *Spire*.

Spezia (spât'si-a), a seaport town and winter resort in Italy, 50 miles E.S.E. of Genoa, on the Gulf of Spezia, with an admirable harbour. It is the chief Italian naval station, has a marine arsenal, ship-building yards, artillery magazines, barracks, &c., and is strongly fortified. There is some trade. Olive-oil and wine are produced in the vicinity. Pop. 38,800.

Spezia (spet'si-a), or SPETSA, an island in the Grecian Archipelago, at the eastern entrance of the Gulf of Nauplia, about 3 miles S.S.W. of the coast of Argolis; length, 4 miles; breadth, about 3 miles. The chief town, bearing the same name, stands on the east coast, and the greater part of the inhabitants are employed in commercial pursuits. Pop. 5000.

Sphærule'ria, a nematode or round parasitic worm existing in certain species of bees. The female is nearly an inch in length, and consists of little else than a mass of fatty tissue with reproductive organs, neither mouth, œsophagus, intestine, nor anus being present. The male is only about the 28,000th part the size of the female.

Sphag'num, a genus of mosses, widely diffused over the earth in temperate climates readily recognized by their pale tint, fasciculate branchlets, and apparently sessile globose capsules. They are aquatic plants, and constitute the great mass of our bogs in swampy and moory districts.

Sphene (sfên), a mineral composed of silicic acid, titanic acid, and lime. Its col-

ours are dull yellow, green, gray, brown, and black. It is found amorphous and in crystals. The primary form of its crystal is an oblique rhombic prism.

Sphe'nodon, a peculiar genus of lizards, regarded as forming a family by itself. The only known species (*S. punctatum*) is a native of New Zealand, and, although once abundant, is now being rapidly thinned. Of late it has become the favourite food of the pig, and is eaten by man. It frequents rocky islets, living in holes in the sand or amongst stones. It is also called *Hatteria punctata*.

Sphe'noid Bone. See *Skull*.

Sphere, in geometry, a solid body contained under a single surface, which in every part is equally distant from a point called the centre. It may be conceived to be generated by the revolution of a semicircle about its diameter, which remains fixed, and which is hence called the *axis* of the sphere. A section of a sphere made by a plane passing through its centre is called a *great circle* of the sphere; and when the cutting plane does not pass through the centre the section is called a *small circle* of the sphere. A sphere is two-thirds of its circumscribing cylinder. Spheres are to one another as the cubes of their diameters. The surface of a sphere is equal to four times the area of one of its great circles, and the solidity is found by multiplying the cube of the diameter by $\cdot 5236$ or $\frac{8}{3}$ of $\cdot 7854$; or by multiplying the area of a great circle by $\frac{2}{3}$ of the diameter.

Sphe'rograph, a nautical instrument consisting of a stereographic projection of the sphere upon a disc of pasteboard, in which the meridians and parallels of latitude are laid down to single degrees. By the aid of this projection, and a ruler and index, the angular position of a ship at any place, and the distance sailed, may be readily and accurately determined on the principle of great circle sailing.

Sphe'roid, a body or figure approaching to a sphere, but not perfectly spherical; in geometry, a solid generated by the revolution of an ellipse about one of its axes. When the generating ellipse revolves about its longer or major axis, the spheroid is *oblong* or *prolate*; when about its less or minor axis, the spheroid is *oblate*. The earth is an oblate spheroid, that is, flattened at the poles, so that its polar diameter is shorter than its equatorial diameter.

Spheroidal State, the condition of a small quantity of liquid when, on being placed on a highly heated surface, as red-hot metal, it

assumes the form of a more or less flattened spheroid, and evaporates without ebullition. The spheroid in this condition does not touch the surface of the metal, but floats on a layer of its own vapour, and evaporates rapidly from its exposed surface. It is heated mainly by radiation from the hot surface, because conduction is impossible since the layer of intervening vapour conducts heat very feebly. The formation of a layer of non-conducting vapour explains why it is possible to dip the wetted hand into molten iron with impunity.

Sphincter, in anatomy, a name applied generally to a kind of circular muscles, or muscles in rings, which serve to close the external orifices of organs, as the sphincter of the mouth, of the eyes, &c., and more particularly to those among them which, like the sphincter of the anus, have the peculiarity of being in a state of permanent contraction, independently of the will, and of relaxing only when it is required that the contents of the organs which they close should be evacuated.

Sphingidæ (sfīn'jī-dæ), a family of lepidopterous insects, section *Crepuscularia*. The insects belonging to this division generally fly in the evening or early in the morning, but there are many which fly in the daytime. This family embraces some of the largest European moths, as the death's-head hawk-moth, and the privet hawk-moth.

Sphinx, a fabulous monster which figures both in the Grecian and Egyptian mythologies. The sphinx of the Greeks is represented with a body like that of a lion, with wings, and with the breasts and upper parts of a woman. Hēra, says the fable, provoked with the Thebans, sent the sphinx to punish them. The sphinx proposed a riddle and devoured anyone who undertook but was unable to interpret its meaning. In this enigma the question proposed was, What animal walked on four legs in the morning, two at noon, and three in the evening. This was at last explained by Œdipus, who said that man walked on his hands and feet when young, or in the morning of life; at the noon of life he walked erect; and in the evening of his days he supported himself upon a stick. Whereupon, her riddle being read, the sphinx destroyed herself. The sphinx was used by the Greeks for artistic and decorative purposes, and seems to have been in some sense symbolic. The Egyptian sphinx had a human head (male or female) on the body of a lion (not winged), and was

always in a recumbent posture, with the fore-paws stretched forward, and a head-dress resembling an old-fashioned wig. The features are like those of the ancient Egyptians found in the ancient ruins. The largest sphinx, that near the group of pyramids at Gizeh, is about 150 feet long and 63 feet high; the body is monolithic, but the paws,



Egyptian Sphinx, from the Louvre Museum.

which are thrown out 50 feet in front, are constructed of masonry. There were also sphinx figures in Egypt with rams' heads and hawks' heads. The Egyptian sphinx was probably a purely symbolic figure, having no historical connection with the Greek fable, and the Greeks may have applied the term to the Egyptian statues merely on account of an accidental external resemblance to their own figures of the sphinx.

Sphinx-moth (*Sphinx Convolvuli*), a species of moth belonging to the family *Sphingidæ* (which see), and deriving its popular name from a supposed resemblance which its caterpillars present when they raise the fore part of their bodies to the 'sphinx' of Egyptian celebrity. The sphinx-moth is found very sparingly throughout England.

Sphrigo'sis, over-rankness, a disease in fruit-trees and other plants, as turnips, in which the plant tends to grow to wood or stem and leaves in place of fruit or bulb, &c., or to grow so luxuriantly that the nutritious qualities of the plant are injured, as in the potato. Sphrigosis is sometimes due to over-manuring.

Sphygmograph, an instrument which, when applied over an artery, indicates the character of the pulse as to the force and extent of undulations, registering them on a strip of paper moved by watch-work. It reveals in a very delicate and beautiful manner, by the tracing of a pencil on the paper, the force of the heart beats, and in

making experiments with different kinds of medicines it shows their effect on the nervous system.

Spice Islands. See *Moluccas*.

Spices, the name given to all those vegetable substances, having an aromatic odour and a hot and pungent flavour, and used for seasoning food; such as cinnamon, cassia, mace, nutmeg, allspice, pepper, cloves, ginger, vanilla.

Spider, the common name of insect-like animals, constituting a section of the class Arachnida, order Pulmonaria. The head and chest are united to form one segment known as a cephalothorax; no wings are developed, and breathing is effected by means of pulmonary or lung sacs. For the most part the Arachnida are oviparous. The abdomen is furnished with from four to six cylindrical or conical mammillæ or processes, with fleshy extremities, which are perforated with numberless small orifices for the passage of silky filaments of extreme tenuity, with which they form webs, and which proceed from internal reservoirs. The spider's web is usually intended to entangle their prey (chiefly flies), but spiders also spin webs to make their abodes, and for other purposes. The legs number four pairs, and no antennæ are developed. Their mandibles are terminated by a movable hook, flexed inferiorly, underneath which, and near its extremity, is a little opening that allows a passage to a venomous fluid contained in a gland of the preceding joint. After wounding their prey with their hooked mandibles they inject this poison into the wound, which suddenly destroys the victim. The common garden or cross spider (*Epeira diadema*), with its geometrical web, is a very familiar species. The great crab spider (*Mygale cancrerides*), and the *M. avicularia* of Surinam, alleged to feed on small birds, are notable forms. To this family also belong the trap-door spiders, which excavate a nest in the ground, and fit to the aperture a curious little door or lid. The tarantula (*Lycosa tarantula*) is regarded in Italy as capable of producing a kind of dancing madness by its bite. The English hunting or zebra spider (*Salicinus scenicus*) is a pretty little arachnid. The *Clotho durandii*, inhabiting Spain and North Africa, is remarkable as constructing a kind of little tent, in the interior of which the eggs, inclosed in little pouches, are contained. The interesting water-spiders (*Argyroneta aquatica*), denizens of freshwater pools, lead a subaqueous life, and con-

struct their nests somewhat in the form of diving-bells with the mouth opening downwards, together with thin webs in which their prey is captured.

Spider-crab, the name given to crabs of the family Maiada from the rough general resemblance their bodies and long legs possess to those of spiders. The *Maia squinado*, or common or thornback spider-crab, is a familiar British species, and is very commonly taken in the crab-pots of fishermen. The four-horned spider-crab (*Arctopis tetraodon*) has a triangular body, possessing four horn-like processes in front, the two central ones forming the rostrum or beak.

Spider-fly, a dipterous insect of the family Pupipara. There are many species of these found parasitic on birds and quadrupeds.

Spider-monkey, a general name applied to many species of platyrrhine or New World monkeys, but more especially to the members of the genus *Ateles*, which are distinguished by the great relative length, slenderness, and flexibility of their limbs, and



Spider-monkey (*Ateles paniscus*).

by the prehensile power of their tails. A familiar species is the chameek (*Ateles Chameek*), which occurs abundantly in Brazil. The body is about 20 inches, the tail 2 feet long, and the colour is a general black. The coaita (*A. paniscus*), another typical species, has an average length of 12 inches; the tail measures over 2 feet long, and the fur is of a dark, glossy, black hue.

Spiderwort, the common name of plants of the genus *Tradescantia*, one species of which, *T. virginica*, is cultivated in gardens.

Spiegeleisen (sp^e gl-i-zn), a peculiar kind of cast-iron made from specular iron ore, or hæmatite, containing a large percentage of carbon and manganese. Being remarkably free from impurities, as phosphorus, sulphur,

silica, it is largely used in the Bessemer process of steel-making for the purpose of re-introducing carbon.

Spielhagen (spēl'hä-gén), **FRIEDRICH**, German novelist, born at Magdeburg, 1829; entered Berlin University, studied law at Bonn, and taught in the Gymnasium at Leipsic until he adopted the profession of literature. His chief novels are: *Problematical Natures* (1861), *Through Night to Light* (1862), *Hammer and Anvil* (1869), *Ever Forward* (1872), *Storm Floods* (1878), *Noblesse oblige* (1888), &c.

Spigelia, worm-seed or worm-grass, a genus of plants, nat. order Loganiaceæ.

Spike, a species of inflorescence in which the flowers are sessile along a common axis, as in the common plantain.

Spikenard, or **NARD**, a highly aromatic herbaceous plant growing in the East Indies, the *Nardostachys Jatamansi*, natural order Valerianaceæ.

The root has a strong smell and a sharp bitterish taste. This is the true spikenard of the ancients, and it has enjoyed celebrity from the earliest period on account of the valuable extract or perfume obtained from its roots, which was used in the ancient baths and at feasts. It is called *jatamansi* or *balchur* by the Hindus, and *sumbul* or *sunbul* by the Arabians. It is highly esteemed in the East as a perfume, and is used to scent oil and unguents. The name spikenard is applied to various other plants, as to *Valeriana celtica*, *Andropogon Nardus*, *Lavandula Spica* (see next art.). In the United States it is applied to *Aralia racemosa*.

Spike-oil, a volatile oil obtained by distilling *Lavandula Spica* (a species of lavender) with water. It has a less agreeable odour than true lavender-oil, and is specifically heavier. It is obtained from the leaves and stalks of the plant, true lavender-oil from the flowers.

Spiking, the operation of driving a nail or spike into the touch-hole of a cannon so as to make it unserviceable. When the spiking

was intended to be only temporary a spring spike was used, which was afterwards released by the stroke of a hammer. In other cases a new touch-hole required to be drilled.

Spin'age, **SPIN'ACH**, a genus of plants, nat. order Chenopodiaceæ. There is only one species, *Spinacia oleracea* (common spinach), well known on account of its use in the kitchen. It is eaten sometimes in salads, but more frequently cooked in various ways. It is wholesome and agreeable, but contains little nutriment. There are two principal varieties cultivated in gardens — the prickly-fruited and the smooth-fruited. What is called *New Zealand spinach* (*Tetragonia expansa*), a plant of the family Mesembryaceæ, is sometimes used instead of common spinach, as is also Australian spinage (*Chenopodium auricolum*). For *mountain spinage* see *Orach*. Indian spinach is *Basella rubra* and *B. alba*.

Spinal Cord, the name given in anatomy to the great cord or rod of nervous matter which is inclosed within the backbone or spine of vertebrates. The spinal cord in man, which is from 15 to 18 inches long, has direct connection with the brain by means of the medulla oblongata, and passes down the back until it terminates in a fine thread at the level of the first lumbar vertebra. (See *Spine*.) Lodged in the bony vertebra it varies in thickness throughout, and like the brain is invested by membranes called respectively *pia mater* and *dura mater*. Situated between these two are the delicate layers of the *arachnoid* membrane, inclosing a space which contains the cerebro-spinal fluid. Besides these protective coverings there is also a packing of fatty tissue which further tends to diminish all shocks and jars. The spinal nerves, to the number of thirty-one on each side, pass out from the cord at regular intervals, pierce the *dura mater*, escape from the backbone, and ramify thence through the soft parts of the body. Eight pairs pass off in the region of the neck called the *cervical* nerves, twelve pairs are *dorsal*, five are *lumbar*, and five *sacral*, while the last pair comes off behind the *coccyx*. In its structure the spinal cord consists of gray and white matter. The gray matter, which is characterized by large cells, is gathered in the centre into two crescent-shaped masses connected at the central part of the cord. The white matter, consisting mainly of fibres, is outside of and surrounds these gray crescents. In its functions the spinal



Spikenard (*Nardostachys Jatamansi*).

SPINDLE—SPINE.

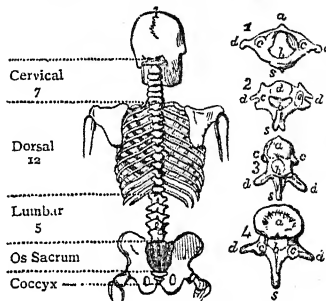
cord forms a tract along which sensory impressions may pass to the brain, and along which motor impulses may travel to the muscles. It is besides a great reflex centre. See *Brain, Nerve, and Spine*.

Spindle, in spinning, a pendent piece of wood for twisting and winding the fibres drawn from the distaff; in spinning-wheels and machinery, the piece that twists the thread, carrying the hobbin on which, when twisted, it is wound. Also a measure of yarn: in cotton 18 hanks or 15,120 yards; in linen 24 heers or 14,400 yards.

Spindle-tree (*Euonymus*), a genus of small trees or shrubs belonging to the natural order Celastraceæ. The leading species are from 10 to 30 feet in height; and in autumn they become attractive by reason of their great profusion of seed-vessels, which are generally of a delicate pink or white colour. The common spindle-tree (*Euonymus europæus*) is found wild in Britain, in France, and throughout the north of Europe. The wood is of a white colour, finely grained, and hard. It was once esteemed as a material for musical instruments and spindles, hence its name. The seed and capsules are used by dyers in the production of various colours.

Spine (*L. spina*, a thorn), the term applied to the backbone of a vertebrated animal, and so called from the thorn-like processes of the vertebrae. The human vertebral column is composed, in the child, of thirty-three separate pieces, but in the adult the number is only twenty-six, several pieces having become blended together. These separate bones are arranged one on the top of the other, with a layer of gristle between each which helps to unite them, while this union is completed by partially movable joints and strong fibrous ligaments. The first seven vertebrae, which are called *cervical*, occupy the region of the neck; twelve form the supports from which spring the ribs, and constitute the main portion of the back, being accordingly called *dorsal*; five in 'the small of the back' are denominated *lumbar*; five pieces follow which, in the adult, unite to form the *sacrum*; and four which unite to form the *coccyx*. The vertebral column so arranged presents two forward curves, the first in the neck, the second at the lower part of the back; and two corresponding backward curves. The vertebrae differ in form according as they belong to the cervical, dorsal, or lumbar region, but they have all certain character-

istics in common. Each possesses what is called a body, an arch which incloses a ring, and various projections and notches by means of which the bones are articulated. When the vertebrae are in position the rings are all situated one above the other, and so form a cavity or canal in which lies the protected spinal cord (which see). The disease to which this bony structure is most liable is called *angular curvature of the spine*. Beginning with inflammation it goes on to



The Human Spine.

1, Atlas, or vertebra supporting the head. 2, Cervical vertebra. 3, Dorsal vertebra. 4, Lumbar vertebra. a, Body. b, Ring. c, Oblique or articular process. d, Transverse process. s, Spinous process.

ulceration (caries), until one or more of the vertebrae becomes soft and breaks down. The result of this is that the vertebrae are crushed together, the backbone bent, and a projection or hump gradually formed behind. The modern method of treatment is to apply to the patient's body, from the hips to the arm-pits, a continuous bandage of plaster of Paris, which affords to the back a close-fitting support. *Lateral curvature of the spine*, unlike the former, is not so much due to disease of the column as to a relaxed condition of the body. It is most liable to attack young rapidly-growing persons between the ages of ten and fifteen. Treatment by plaster-of-Paris bandage may be necessary; but strengthening food, regular, moderate exercise, and cold bathing may prove sufficient to effect a cure.

Spine, in botany, a sharp process from the woody part of a plant. It differs from a *prickle*, which proceeds from the bark. A spine sometimes terminates a branch, and sometimes is axillary, growing at an angle formed by the branch or leaf with the stem. The wild apple and pear are armed with spines; the rose, bramble, gooseberry, &c.,

are armed with prickles. The term is applied in zoology to a stout, rigid, and pointed process of the integument of an animal, formed externally by the epidermis and internally of a portion of the cutis or corresponding structure.

Spinnelle, or **SPINEL**, a species of gem, a sub-species of corundum, which occurs in regular crystals and sometimes in rounded grains. Its colours are red, black, blue, green, brown, and yellow. It consists chiefly of alumina, with smaller proportions of magnesia, silica, and protoxide of iron. Clear and finely-coloured red varieties are highly prized as ornamental stones in jewelry. The red varieties are known as *spinnelle ruby* or *balas ruby*, while those of a darker colour are called *Ceylonite* or *Pleonast*. It is found in the beds of rivers in Ceylon and Siam, and embedded in carbonate of lime in North America and Sweden.

Spin'et, an old stringed instrument with a key-board for the fingers, somewhat similar to the harpsichord but smaller in size, one of the precursors of the piano. The strings were sounded by means of crow-quill plectra, as in the harpsichord.

Spinifex. See *Porcupine-grass*.

Spinning is the art of twisting a thread from wool, flax, cotton, or other such material. From remote times this process was accomplished by means of a distaff round which the wool or other fibre to be spun was coiled, and a spindle or round stick tapering at each end and with a notch for fixing the yarn or thread at the upper end as the spinning went on. The spindle was twirled round, for the purpose of twisting the thread, generally by a movement against the right leg, and while the left hand of the spinner guided and supplied the fibre, the right hand fashioned it into a thread between finger and thumb. The earliest improvement on this method was to fix the spindle horizontally in a frame and cause it to revolve rapidly by means of a band passed round a large wheel. At a later period a treadle motion was added, and the spinner's hands were left free (see *Spinning-wheel*); while a further improvement was effected by the introduction of a double spindle-wheel, with twisting arms on the spindles. This was the spinning implement which obtained until the invention, about 1767, of the spinning-jenny. See *Cotton Spinning*.

Spinning-jenny, the name given to the first spinning-machine by means of which a number of threads could be spun at once.

It was invented about 1767 by James Hargreaves, a Lancashire weaver, and consisted of a number of spindles turned by a common wheel or cylinder worked by hand.

Spinning-wheel, a machine for spinning wool, cotton, or flax into threads by the hand. It consists of a wheel, band, and spindle, has a distaff attached, and is driven by foot or by hand, usually the former, a treadle being employed. Before the introduction of machinery for spinning there were two kinds of spinning-wheels in common use, the *large wheel* for spinning wool and cotton, and the *small or Saxon wheel* for spinning flax. See *Spinning*.

Spin'ola, AMBROSIO, MARQUIS OF, a distinguished general and member of an ancient Italian family, was born at Genoa about 1569, and died 1630. He joined the Spanish forces in the Netherlands, and when the Archduke Albert of Austria had failed to reduce Ostend after a lengthy siege, he was superseded by Spinola, who was successful (1604). He was thereupon appointed commander-in-chief of all the Spanish and Italian forces in the Netherlands. During the following five years he frequently encountered Maurice, prince of Orange, with no decisive results, and at length the war was finished by an armistice (1609). Spinola was next actively engaged in the Thirty Years' war. In 1620 he conquered the Lower Palatinate, and when the armistice with Holland was broken he invaded that country. He laid siege to Bergen-op-Zoom, from which he had to retreat; but in 1624 he invested and reduced Breda after ten months' siege. This was his last great military achievement.

Spino'za, BARUCH, or as he afterwards called himself, BENEDICT DE SPINOZA, was born in 1632, of Portuguese Jewish parents, in the then free city of Amsterdam, and died in 1677. He was trained in Talmudic and other Hebrew lore by Rabbi Morteira; acquired a knowledge of Latin from the free-thinking physician Van den Ende; came under the influence of the new philosophic teaching of Descartes; ceased to attend the synagogue; refused a pension offered by the rabbis for his conformity, and was expelled from the Israelitish community; fled from Amsterdam to the suburbs to escape the enmity of the fanatical Jews; removed from thence, after five years' seclusion, to Rynsburg, where he lived until 1663; subsequently went to Voorburg; and ultimately (1671) settled in the Hague, where he died.

By his craft as a grinder of optical lenses he maintained a frugal position in the households of the friends with whom he lived. He refused a pension from the French king and a professorship in Heidelberg because their acceptance might hazard that high freedom of thought and conduct which was ever his jealous care; but he accepted a



Benedict de Spinoza.

legacy from his friend De Vries. This annuity enabled him to devote a large part of his time to the study of philosophy. The first result of his labour was published anonymously in 1670 under the title of *Tractatus Theologico-Politicus*, and, because it put forth a strong plea for liberty of speech in philosophy, it was placed on the Index by the Catholics, and condemned by the authorities in Holland. Such, indeed, was the storm which this treatise occasioned that the author himself published nothing further. After his death all his unpublished writings were conveyed to Amsterdam, and there the *Opera Posthuma* was published (1677). In the *Ethics*, therein included, his system of philosophy was developed; each of its five books being dignified by a series of axioms and definitions after the method of Euclid in his geometry. In all there are twenty-seven definitions, twenty axioms, and eight postulates; and the central conception of the whole system is, that God, who is the inherent cause of the universe, is one absolutely infinite substance, of which all the several parts which we recognize are but finite expressions; that man, being but a part of this greater whole, has neither a separate existence nor a self-determining will; but that he can, by means of knowledge and love, so far control his

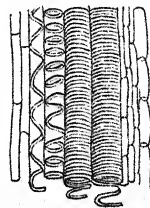
passions as to enter into the joy which springs from this idea of an all-embracing God. An English translation of Spinoza's works has been made by R. H. M. Elwes (1883), and of the *Ethics* by W. H. White.

Spiracle, the name given to the apertures existing on the sides of the body in insects, centipedes, spiders, &c., and through which air is admitted to the breathing organs, which consist of air-tubes. As commonly seen, each spiracle presents the form of a rounded or oval opening, the margin of which is formed by a horny ring. The opening itself may be closed by a kind of grating, and may be surrounded by delicate bristles or hairs. The name is also applied to the single nostril of the hag-fishes, the blow-hole of the cetaceans, &c.

Spiræa, a genus of plants, nat. order Rosaceæ. The species, which are diffused through the temperate parts of the northern hemisphere, consist of small unarmed shrubs or perennial herbs, with simple or compound leaves and racemes or corymbs of white or reddish flowers. Several North American, Indian, and Japanese shrubby species are in cultivation. Two species are British, and are known by the name of *meadow-sweet*.

Spiral, in geometry, the name given to a class of curves distinguished by this property, that they continually recede from a centre or fixed point, while they continue to revolve about it. The moving point is the *generatrix* of the spiral, the fixed point is the *pole* of the spiral, and the distance from the pole to any position of the generatrix is the *radius vector* of that point.

Spiral Vessels, in vegetable anatomy, fine transparent membranous tubes, with one or more spiral fibres coiled up in their interior. They are generally present among the other vessels of plants, and in trees are found chiefly in the medullary sheath surrounding the pith. The fibre may be single or double, or it may be composed of numerous threads. Their function is supposed to be that of the conveyance of air. They are easily discovered on breaking asunder the leaves and stalks of many plants, when the fibres may be unrolled, and present themselves as delicate filaments like the threads of a cobweb.



Spiral Vessels of Rhubarb, with cell tissue on each side—highly magnified.

Spire, a term specifically applied to the tapering portion of a steeple rising above the tower, but sometimes loosely applied to the steeple itself. The earliest spires, in the architectural sense, were merely pyramidal or conical roofs, specimens of which still exist in Norman buildings. These roofs, becoming gradually elongated and more and more acute, resulted at length in the elegant tapering spire. The spires of mediæval architecture (to which alone the term is appropriate) are generally square, octagonal, or circular in plan; they are sometimes solid, more frequently hollow, and are variously ornamented with bands encircling them, with panels more or less enriched, and with spire lights, which are of infinite variety. Their angles are sometimes crocketed, and they are almost invariably terminated by a finial. The term spire is sometimes restricted to signify such tapering buildings, crowning towers or turrets, as have parapets at their base. When the spire rises from the exterior of the wall of the tower without the intervention of a parapet it is called a *broach*.

Spires (German, *Speyer* or *Speier*), a town in Bavaria, capital of the Rhenish Palatinate, at the confluence of the Speyerbach with the Rhine, 10 miles s.s.w. of Mannheim. In early times Spire was a fortified outpost of the Romans, and after Charlemagne it was long the residence of the emperors of Germany and the seat of the Germanic Diet. The prosperity of Spires began to decline in the 17th century by a change in the channels of trade, and in 1689 the city was burned and blown up with gunpowder by the soldiery of Louis XIV. For many years it remained a heap of rubbish, but since it came into possession of Bavaria in 1816 the old buildings have been restored. The chief edifice is the cathedral, a Romanesque basilica, a simple but vast and imposing building, begun in 1030 by Conrad II. and completed by Henry IV. in 1061. When the city was burned the blackened walls of this building remained, but the ashes of the eight German emperors buried in the choir were scattered. It was not till the nineteenth century that it was repaired and adorned. At the Diet of Spire held in 1529 the reformers adopted the protest which conferred on them the name of Protestants. Pop. 20,911.

Spirit, immaterial intelligence, intelligence conceived of as apart from any physical or corporeal embodiment, or an intelli-

gent being so existing apart; also applied to the soul, to a disembodied soul, a spectre, &c.

Spirit, SPIRITS. See *Alcohol*.

Spirit-level, an instrument employed for determining a line or plane parallel to the horizon, and also the relative heights of ground at two or more stations. It consists of a tube of glass nearly filled with spirit of wine, and hermetically sealed at both ends, so that when held with its axis in a horizontal position the bubble of air which occupies the part not filled with the liquid rises to the upper surface and stands exactly in the middle of the tube. The tube is placed within a brass or wooden case, which is laid on the surface to be tested, and the slightest deviation from the horizontal is indicated by the bubble rising towards the higher end of the tube.

Spiritualism is the term used in philosophy to indicate the opposite of *materialism*, but is now also specifically applied to the belief that communication can be held with departed spirits by means of rappings or noises, writings, visible manifestations, &c. The belief in such manifestations has long obtained, but in its limited and modern form spiritualism dates from the year 1848. In this year a Mr. and Mrs. Fox, who lived with their two daughters at Hydeville, New York, were disturbed by repeated and inexplicable rappings throughout the house. At length it was accidentally discovered by one of the daughters that the unseen 'rapper' was so intelligent as to be able to reply to various pertinent questions, and so communicative as to declare that he was the spirit of a murdered pedlar. When this discovery was noised abroad a belief that intercourse could be obtained with the spirit-world became epidemic, and numerous 'spirit-circles' were formed in various parts of America. The manifestations thus said to be got from the spirits were rappings, table-turnings, musical sounds, writings, the unseen raising of heavy bodies, &c. Part of the peculiarity of these phenomena was that they were always more or less associated with a *medium*, who was supposed to have an organization sensitively fitted to communicate with the spirit-world. The first professional *medium* who came to Europe was a Mrs. Hayden, and she was followed in 1855 by Daniel D. Home, who visited nearly all the courts of Europe. The latter possessed unusual powers, and was said to be able to float up to the ceiling or out of the window into the next room. Such claims

not only attracted the curious, and converted the unthinking, but also received the attention of legal and scientific men. In America Judge Edmonds and Professor Hare undertook to expose their fallacy, but both had to admit the genuineness of some of the evidence; while in England the truth of the phenomena gained the assent of such eminent converts as A. R. Wallace, Sir Wm. Crookes, and Professor De Morgan. The London Dialectical Society appointed a committee to investigate the phenomena, and the report (1871) admits the genuineness of the phenomena, but does not seek to explain their origin. In America the believers in spiritualism are very numerous, and have many newspapers, magazines, and books to explain and enforce their belief. Notwithstanding this testimony spiritualism has been greatly discredited in England by the fact that nearly all public mediums have been convicted of fraud. The popular belief seems to be that the phenomena of spiritualism are the result either of self-delusion on the part of believers, unconscious deception on the part of the medium, or clever conjuring. The more recent investigations of the Psychical Society, however, seem to show that there are forces connected with hypnotism and its kindred phenomena which may explain the occult occurrences of spiritualism on natural, though hitherto little known, laws. The literature on the subject is extensive.

Spirom'eter, a contrivance for determining the capacity of the human lungs. The instrument most commonly employed consists of an inverted chamber submerged in a water-bath. The breath is conducted by a flexible pipe and internal tube, so as to collect in the chamber, which rises in the water, and is fitted with an index which marks the cubic inches of air expired after a forced inspiration.

Spir'ula, a genus of cuttle-fishes or cephalopods, comprising only three known species,



1, *Spirula australis*.

2, Its shell.

so named from their very delicate shell being rolled into a spiral form. The shells are very numerous on the shores of New Zea-

land, but the animal forming them is extremely rare, being seldom found except in a fragmentary state.

Spit'alfields, a parish in London, borough of Stepney, a mile E.N.E. of St. Paul's. The manufacture of silk was introduced here by French Protestant refugees after the revocation of the Edict of Nantes in 1685, but it is now all but extinct. The parish is named from the hospital of St. Mary, founded in 1197. Pop. 24,208.

Spithead', the roadstead at the entrance of Portsmouth harbour, extending about 2 miles north-west and south-east, with an average width of 1½ mile. See *Portsmouth*.

Spitzber'gen, a group of six large and several small islands in the Arctic Ocean, nearly equidistant between Greenland and Nova Zembla; area, about 27,000 sq. miles. The largest are West Spitzbergen and North-east Land. Their interior is imperfectly known, but the coasts have been repeatedly explored, and present great glaciers and mountains, some over 4500 feet in height. The climate is severe, and vegetation is confined to narrow limits, but there are over 100 flowering plants. For four months in winter the sun is below the horizon, and for an equal period in summer always above it. The larger animals are foxes, bears, and reindeer, while sea-fowl are numerous. The minerals are known to include marble and good coal. The group was discovered in 1553 by Willoughby, the English navigator, and was again visited in 1596 by the Dutch navigator Barentz. Among later explorers are Leigh Smith, Nordenskjöld, and Sir Martin Conway. The islands have been used as a base for polar expeditions; tourists visit them in summer, and a tourist hotel was built in 1896.

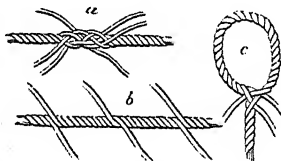
Spitz-dog, or **POMERANIAN**, a small dog, with fox-like head, soft, fluffy under-coat, long, straight, glistening over-coat, and a very hairy tail twisted over the back. Formerly all white, they are now often black, blue, brown, or particoloured. They are favourite pets, but rather bad-tempered.

Spleen, **THE**, in man, is the chief of the ductless or blood glands, and its action is supposed to affect the quality of the blood. This gland, which in man is situated in the belly to the left side of the stomach, is an elongated, flattened structure about 5 inches in length, 3 inches broad, and 7 ounces in weight. Its supply of blood is received directly from the aorta by means of the *splenic artery* and, after passing through

the organ, is carried off by the *splenic vein* which joins the portal vein. It is composed of a fibrous tissue divided into an irregular net-work of spaces which contain the *spleen pulp*. This pulp consists of masses of round white corpuscles, some larger and some smaller, which are called the *Malpighian bodies* of the spleen. Through each one of these cellular masses there passes a branch from the splenic artery, and in this way the blood filters through the pulp as though it were a sponge, and is then collected by the veins. The function of the spleen is not clearly known, but it is supposed that the active cells of the pulp either remove old red cells from, or add new white cells to, the blood current in its passage through the organ. The ancients supposed the spleen to be the seat of melancholy, anger, or vexation, and of evil humours generally.

Spleenwort, the common name of various British ferns of the genus *Asplenium*. These plants were so named because they were supposed to remove disorders of the spleen. They grow upon rocks and old walls.

Splicing, the union or joining together of two ropes or parts of a rope by a particular manner of interweaving part of the untwisted strands. The *long splice* occupies a great



Splices of Ropes.

a, Short Splice. b, Long Splice. c, Eye Splice.

extent of rope, but by the three joinings being fixed at a distance from one another, the increase of bulk is diminished, hence it is adapted to run through the sheave-hole of a block, &c. The *short splice* is used upon ropes not intended to run through blocks, and the *eye splice* forms a sort of eye or circle at the end of a rope.

Splint, in surgery, a thin piece of wood or other substance, used to hold or confine a broken bone when set, or to maintain any part of the body in a fixed position. A *plaster-of-Paris splint* is made by charging a bandage of muslin or other open material with plaster of Paris, and washing over each layer with water. The plaster hardens rapidly.

Splint-armour, a name given to that kind

of armour which was made of several overlapping plates, but never came into very general use. Mention of splint-armour first occurs about the reign of Henry VIII.

Splint-bone, one of the two small bones extending from the knee to the fetlock of a horse, behind the canon or shank bone.

Spügen (spli'gen), a mountain pass which traverses the Rhaetian Alps from the canton of Grisons, Switzerland, into Italy; height, 6940 feet. The modern road was constructed in 1823 by the Austrian government, and is protected from avalanches by three galleries of solid masonry.

Spode, a material composed of calcined ivory of which vases and ornaments are made.

Spohr (spör), LUDWIG, a German violinist and musical composer, was born in Brunswick 1784, died 1859. He was appointed in 1805 conductor of the court concerts at Gotha, was then attached to the theatre in Vienna, and finally (from 1823) was musical director to the electoral court of Hesse-Cassel. He is the author of several operas and various compositions for the violin, but he is probably best known by his oratorio of *The Last Judgment*, and his symphony called *The Consecration of Sound*.

Spoil Five, a round game of cards played with the whole pack of fifty-two, and by any number of persons up to ten. When the cards are cut the card on the top of the pack is trumps, and each player receives five cards. The player who takes three tricks wins the game, but when no one takes three tricks the game is said to be *spoiled*.

Spokane (spo-kan'), SPOKANE FALLS, a town of Washington, U.S., at the falls of the Spokane river, a place of recent upgrowth, a centre of mining and lumbering, and with various active industries. Pop. 36,848.

Spole'to, an ancient town of Italy, prov. Perugia, 60 miles N.N.E. of Rome. Situated on a steep height, the town is approached by a long and lofty bridge, also used as an aqueduct, and has a noteworthy cathedral, two other fine churches, &c. Pop. 12,000.

Spondee, a poetic foot of two long syllables, used in Greek and Latin poetry.

Spon'dias. See *Hog-plum*.

Sponge, the name commonly given to the animals of the class Porifera, a class of organisms representing a distinct morphological type, intermediate between the Protozoa and the Coelenterata. The typical members are composed of two elements, an internal supporting framework or skeleton,

and a soft gelatinous investing substance called *sarcode*, or 'flesh.' The framework consists of horny, reticulated, elastic fibres, which interlace in every direction, strengthened by calcareous, or, more generally, by siliceous spicula. This framework is the sponge of commerce. The sponge-flesh investing this framework is composed of an aggregation of organless, protoplasmic, and amoebiform bodies, some ciliated and others capable of emitting pseudopodia. A constant circulation of water goes on in the living sponge, and by this circulation the animal is nourished. Reproduction takes place both by gemmation and true ova. Sponges have been classified into three groups: (a) *Myxospongiae*, few in number, in which no skeleton of any kind exists. (b) *Calcispongiae*, or limy sponges, which have no horny skeleton, but are composed of limy spicules. (c) *Fibrospongiae*, or those in which a fibrous skeleton exists, strengthened usually by flinty spicules. The name *glass-sponges* is given to certain sponges having a highly ornamental glass-like appearance. Venus's flower-basket and the glass-rope zoophytes are examples. In common usage the term sponge is employed to designate the fibrous framework of sponges as sold in our shops. This framework is soft, light, and porous, easily imbibing fluids, and as readily giving them out again upon compression. Burnt sponge was formerly a valued remedy for scrofulous diseases and goitre; but iodine and bromine, from which it derived all its value, are now administered in other forms. Mattresses, &c., are stuffed with sponge; and it is also employed as a filter and as a polishing material for fine surfaces. Sponges are usually prepared before they come into the market, by being beaten and soaked in dilute muriatic acid, with a view to bleach them and dissolve any adherent portions of carbonate of lime. The kinds most fit for use are found in the seas of warm climates. Two species are chiefly brought from the Levant, and a coarse one from the West Indies and the coast of Florida. Sponges have been artificially cultivated in the Adriatic and in Florida by means of planting cuttings in suitable waters.

Sponging-house, a victualling-house or tavern, where persons arrested for debt were kept by a bailiff for twenty-four hours before being lodged in prison, in order that their friends might have an opportunity of settling the debt. Sponging-houses were so named

from the extortionate charges made upon prisoners for their accommodation.

Sponsor, one who is surety for an infant at baptism, professing the Christian faith in its name, and guaranteeing its religious education; a godfather or godmother. Up till the 9th century the actual parents were allowed to become sponsors, but this was prohibited by the council of Mainz (813), and the prohibition still continues in the R. Catholic Church. The Roman and Greek Catholic Churches consider the relation of the sponsor to the godchild a kind of adoption, and therefore forbid marriage between them. The Book of Common Prayer enjoins that there shall be two godfathers and one godmother for a male child, and two godmothers and one godfather for a female, but this is not rigidly adhered to.

Spontaneity, the doctrine that there is a tendency, for the various muscular movements called voluntary, to begin without reference to any purpose or end, being prompted simply by the discharge of power from the brain, and being entirely independent of the stimulus of sensations. The great activity of young animals, as puppies and kittens, after refreshment and repose, is a good example of spontaneity.

Spontaneous Combustion. See *Combustion (Spontaneous)*.

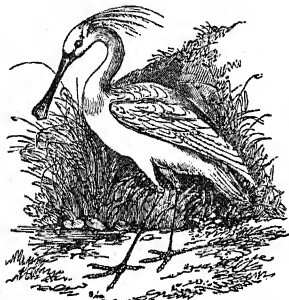
Spontaneous Generation. See *Generation (Spontaneous)*.

Spoon, the half-pike formerly carried by infantry officers, and used for signalling orders to the regiment. Their use was discontinued in the British army in 1787.

Spoon, a small domestic utensil of various materials, with a bowl or concave part and a handle, used at table for taking up and conveying to the mouth liquids and liquid food. Spoons, when made of silver or plated metals, are generally formed by stamping; while spoons of Britannia metal and similar fusible alloys are formed by casting in brass moulds. Formerly great numbers of spoons were made of horn, and in rural localities such spoons are still in use. The old-fashioned *apostle-spoons* were so called from bearing a figure of one of the apostles.

Spoonbill, the popular name of the birds of the genus *Platalea* belonging to the heron family (Ardeidae), order Grallatores, from the shape of the bill, which is somewhat like a spoon, being curiously widened out at the tip. They live in society in wooded marshes, generally not far from the mouths of rivers, and on the sea-shore. The white

spoon-bill (*P. leucorodia*) inhabits Europe generally, being rare, however, in England, although common in Holland in summer. As winter approaches it migrates to the salt marshes on the Mediterranean coasts. The colour is pure white, the breast being yellow, with a naked patch of skin on the throat;



White Spoonbill (*Platalea leucorodia*).

the legs are black, and the bill, which is about 8 inches in length, is black, and yellow at the tip. The roseate spoon-bill (*P. ajaja*) is an American species, with the plumage of a fine rose colour.—The name of spoonbill is also given to a kind of sturgeon (*Polyodon spatula*) found in the Ohio, Mississippi, &c. See *Paddle-fish*.

Spoon-worm, a name for various animals of the class worms or Anarthropoda, section Gephyrea, in particular *Thalassēma Neptūni*, so called on account of the spoon-like appendage to the proboscis, found on the coast of England. This species is much used as a bait by fishermen. All the species of this genus are remarkable for the wonderful power of contraction and expansion possessed by the skin, and the extraordinary manner in which they can alter their shape. Allied spoon-worms belong to the genus *Sipunculus*. All are inhabitants of the sea.

Sporades, the general name for a group of small islands in the Grecian Archipelago, lying to the east of the Cyclades. They belong partly to Greece and partly to Turkey. The principal are Scio, or Chios, Samos, Cos, Rhodes, Lesbos, and Patmos.

Sporadic, applied to a disease which occurs in single and scattered cases as distinct from epidemic and endemic, when many persons are affected.

Sporangium, in botany, the case in which the spores or reproductive germs of cryptogams are formed.

Spores, applied in zoology to the germs of some of the lowest classes of animals, especially the Protozoa, which, together with plant spores, may be borne in immense numbers by the atmosphere. The term 'germs' is now more common along with the designations *bacteria*, *bacilli*, &c. See *Germ Theory*.

Spores, in botany, the reproductive bodies of cryptogamic plants. As a spore does not contain an embryo, but consists merely of one or more cells variously combined together, it is called a *spore* to distinguish it from a true seed. Amongst fungi the name is restricted to those reproductive bodies which are produced either singly or in little chains at the tips of the fruit-bearing threads.

Sporidium, in botany, a name given to the spores of fungi and lichens when they are contained in asci or little sacs. Sporidia, like spores, may consist of one or more cells, and these may be covered with a distinctly organized cuticle, as in many truffles. In the figure *a* shows asci and sporidia of a species of *Peziza*, *b* sporidium.



Sporidia.

Sporran, SPORAN, the pouch or large purse worn by Highlanders in full dress, usually made of the skin of some animal with the hair on, and often ornamented with silver and cairngorms or other stones. It is worn in front of the kilt or philibeg.

Sports, THE BOOK OF, a popular name for the proclamation issued in 1618 by James I., and ordered to be read in all churches, wherein it was declared that dancing, archery, May-games, morrice-dances, leaping, vaulting, and other such games, were lawful on Sunday after divine service, but prohibiting bear-baiting, bull-baiting, bowling, and interludes. The order to read this declaration was largely disregarded, but in the reign of Charles I. it was republished (1633) and enforced with severity. This created great outcry and opposition, and in 1644 the Long Parliament ordered all copies of it to be collected and publicly burned.

Spotiswood (or SPOTSWOOD), JOHN, Archbishop of St. Andrews, born in 1565, died 1639. He was educated at the University of Glasgow; became chaplain to the Earl of Lennox, whom he accompanied (1601) to France; as a favourite with King James he was selected to go with the king to England (1603), but, the vacancy having unex-

pectedly occurred, he was appointed archbishop of Glasgow; afterwards (1615) he was transferred to the archbishopric of St. Andrews, and became primate of Scotland; while in 1633 he crowned Charles I. at Holyrood, and two years thereafter was made chancellor of Scotland. By his harsh prosecution of Lord Balmerino for sedition, and by other measures, he became unpopular, and for his endeavours to force the liturgy and book of canons into Scotland he was deposed by an Assembly held at Glasgow in 1638, whereupon he removed to London. He is the author of a History of the Church of Scotland, beginning at 203 A.D. and brought down to the reign of James VI.

Spot-lens, in optics, a condensing lens in a microscope, in which the light is confined to an annular opening, the circular middle portion being obstructed by a spot, which forms the dark background behind the semi-translucent illuminated object.

Spotted Fever, the name of a form of typhus fever (which see), but now usually applied to epidemic cerebro-spinal meningitis. See *Cerebro-spinal Fever*.

Spottiswoode, WILLIAM, mathematician and physicist, born in London 1825, died 1883. He was educated at Balliol College, Oxford. In 1845 he took a first class in mathematics, and in the following year became manager of his father's printing establishment. He was the author of *A Taran-tasse Journey through Eastern Russia* (1857); *Meditationes Analyticae*, a treatise on The Polarization of Light; several papers to the Geographical Society, one of which was on Typical Mountain Ranges; and a paper to the Astronomical Society on A Method of Determining Longitude. He was president of the Mathematical Society (1871), of the British Association (1878), and of the Royal Society (1879).

Spout-shell, a name sometimes given to the pelican's foot (*Aporrhais pes-pellicani*), a British mollusc: so called from the manner in which the aperture of the shell is lengthened into a kind of spout in front. Also a name of several molluscs that squirt out water.

Sprague (spräg), WILLIAM BUEL, D.D., American clergyman and prolific writer, born 1795, died 1876. He graduated at Yale, studied at Princeton theological seminary, and for forty years was pastor of the second Presbyterian church at Albany, N.Y. He published many sermons, addresses, lectures, essays, letters, &c.; but his principal work

is *Annals of the American Pulpit* (New York, nine vols. 1857-69).

Sprain, the violent straining or twisting of the ligaments and tendons which form the soft parts surrounding a joint. The ordinary consequence of a sprain is to produce some degree of swelling and inflammation in the injured part. The best treatment is to give the limb perfect rest, by means of splints or otherwise, and to foment the part for an hour or two with warm water. If the inflammation increases leeches should be applied. When this has passed the joints should be gently rubbed with a liniment of soap and opium. The joint often remains weak and faint for a length of time, and too great caution cannot be observed in bringing it again into use.

Sprat, a small fish of the herring family, *Harengula (Clupea) sprattus*. At one time the sprat was thought to be the young of the herring, pilchard, or shad; but it can be easily distinguished from the young of either of these fishes by means of the sharply-notched edge of the abdomen, the ventral fins beginning beneath the first ray of the dorsal fin, and by the want of axillary scales to the ventral fins. It is found in the North Atlantic and Mediterranean, and on many parts of the British coasts. It is generally considered as a delicious, well-flavoured, and wholesome fish. It is also known by the name of *garvie*, or *garvie herring*.

Sprat-sucker (*Lernæodoma spratti*), a genus of parasitic crustaceans, belonging to the Lernæadæ (which see), and so named from its habits of infesting the eyes of sprats.

Spree (sprä), a river of North Germany, rises in the east of Saxony, enters the Prussian province of Brandenburg, passes the towns of Spremberg, Kottbus, Lübben, &c., traverses Berlin, and a little below Charlottenburg joins the Havel at Spandau, after a course of about 220 miles, of which over 100 is navigable. The Friedrich Wilhelm Canal connects it with the Oder a short distance above Frankfurt.

Spremburg, a town of Prussia, prov. of Brandenburg, on the Spree, with woollen and other manufactures. Pop. 10,999.

Spring, one of the four seasons of the year. For the northern hemisphere the spring season commences when the sun enters Aries, or about the 21st of March, and ends at the time of the summer solstice, or about the 22d of June. In common language, spring is usually regarded as commencing with March and ending with May.

In the southern hemisphere the astronomical spring begins September 23, and ends December 21.

Spring, an outflow of water from the earth, or a stream of water at the place of its source. Springs have their origin in the water which falls upon the earth in the form of rain or snow, and sinks through porous soils till it arrives at a stratum impervious to water, where it forms subterranean reservoirs at various depths. When the pressure of the water which fills the channels through which it has descended is sufficient to overcome the resistance of the superincumbent mass of earth, the water breaks through the superficial strata and gushes forth in a spring; or it may find some natural channel or crevice by which to issue. In descending and rising through various mineral masses the water of springs often becomes impregnated with gaseous, saline, earthy, or metallic admixtures, as carbonic acid gas, sulphuretted hydrogen gas, nitrogen, carbonate of lime, silica, carbonate of iron, &c. When these substances are present in considerable quantity the springs become what are known as *mineral springs*. Warm and hot springs are common, especially in volcanic countries, where they are sometimes distinguished by violent ebullitions. (See *Geysers*.) Some springs run for a time and then stop altogether, and after a time run again, and again stop; these are called *intermittent springs*. Others do not cease to flow, but only discharge a much smaller quantity of water for a certain time, and then give out a greater quantity; these are called *variable springs*.

Spring, an elastic body, the elasticity of which is made practically available. Springs are made of various materials, as a strip or wire of steel coiled spirally, a steel rod or plate, strips of steel suitably joined together, a mass or strip of india-rubber, &c., which, when bent or forced from its natural state, has the power of recovering it again in virtue of its elasticity. Springs are used for various purposes — diminishing concussion, as in carriages; for motive power, acting through the tendency of a metallic coil to unwind itself, as in clocks and watches; or to communicate motion by sudden release from a state of tension, as the spring of a gun-lock, &c.; others are employed to measure weight and other force, as in the spring-balance, as regulators to control the movement of wheel-works, &c.

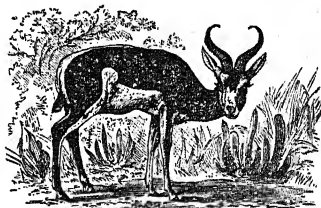
Springal, an ancient warlike engine, used

for shooting large arrows, pieces of iron, &c. It is supposed to have resembled the cross-bow in its construction.

Spring-balance, a contrivance for determining the weight of any article by observing the amount of deflection or compression which it produces upon a spiral steel spring properly adjusted and fitted with an index working against a graduated scale. See *Balance*.

Spring-beetles, the name given to a group of beetles. See *Elater*.

Spring-bok, **SPRING-BOC** (*Antilope eu-chore*), a species of antelope nearly allied to the gazelle, found in vast herds in South Africa, and used as food by the colonists.



Spring-bok (*Antilope eu-chore*).

It is a very beautiful animal, of graceful form and fine colours — fulvous brown on the upper parts, pure white beneath, with a broad band of deep vinous red where the colours meet on the flanks. It is larger than the roebuck, and its neck and limbs much longer and more delicate. The horns curve in a lyre-shape, and are small in the female. It receives its name from its singular habit of leaping perpendicularly to the height of several feet.

Springer, in architecture, the impost or place where the vertical support to an arch terminates and the curve of the arch begins; or the lowest voussoir or bottom stone of an arch which lies immediately upon the impost.

Springer, a name given to several varieties of the spaniel. The ears are long and pendulous, and the colour usually white with red spots. It is employed to start or spring birds from coverts. The chief breeds are the Clumber, Sussex, and Norfolk. See *Spaniel*.

Springfield, a city, capital of Hampden county, Massachusetts, United States, situated on the left bank of the Connecticut, here navigable, about 98 miles west by south from Boston. It contains many fine

churches and other buildings, and the streets are wide and planted with shade trees. Here is the United States armoury, in which large numbers of rifles are manufactured, and there is also a government arsenal. There is a large city library. Water-power is furnished by Mill River, and there are iron-works, machine-shops, paper, cotton, and other mills, railway-car and motor-car works, works for electric apparatus, &c. Pop. 62,059.

Springfield, the capital of Illinois, United States, and seat of justice for Sangamon county, 96 miles N.N.E. of St. Louis. Its public edifices include a state-house or capitol, a large and imposing building in the classic style with a dome 320 feet high; a court-house and post-office building, and the national monument to Abraham Lincoln, who is buried here, an obelisk nearly 100 feet high. Among the manufacturing establishments are woollen mills, rolling-mills, foundries, and there are coal-mines in the neighbourhood. Pop. 34,159.

Springfield, a city, capital of Clarke county, Ohio, United States, on the east fork of Mad River, 43 miles west by south of Columbus. It has a court-house and other public buildings, numerous mills and manufacturing establishments (especially for agricultural implements and machines, including reapers and mowers), and an extensive trade. Pop. 38,253.

Springfield, a city of the United States, capital of Greene county, Missouri, on the summit of the Ozark Mountains, in the midst of rich lead and zinc mines. Pop. 23,267.

Spring-tails, a family of apterous insects belonging to the order Thysanura, and distinguished by the possession of an elastic forked caudal appendage which is folded under the body when at rest, and by the sudden extension of which they are enabled to make considerable leaps; hence their popular name of spring-tails. Their scales are favourite test objects for microscopes.

Spring-tide, the tide which happens at or soon after the new and full moon, which rises higher than common tides. At these times the sun and moon are in a straight line with the earth, and their combined influence in raising the waters of the ocean is the greatest, consequently the tides thus produced are the highest. See *Tide*.

Sprit, a small boom, pole, or spar which crosses the sail of a boat diagonally from the mast to the upper aftmost corner, which it

is used to extend and elevate. Such a sail is called a *sprit sail*. The same name was formerly given to a sail attached to a yard under the bowsprit of large vessels.

Sprottau, a town of Prussia, prov. of Silesia, district of Liegnitz, at the confluence of the Sprotte with the Bober. Pop. 7846.

Spruce, the name given to several species of trees of the genera *Picea* and *Abies*. The Norway spruce is *P. excelsa*, which yields the valuable timber commonly known as white or Christiania deal. It is a native of great part of Northern Europe, and is a noble tree of conical habit of growth, reaching sometimes the height of 150 feet. The white spruce is *P. alba*, the black spruce-fir is *P. nigra*, both natives of North America. The latter attains the height of 70 or 80 feet, with a diameter of from 15 to 20 inches. Its timber is of great value on account of its strength, lightness, and elasticity, and is often employed for the yards of ships and the sides of ladders. From the young shoots is extracted the *essence of spruce*, a decoction used in making spruce beer. The hemlock spruce-fir is the *A. canadensis*, a noble species, rising to the height of 70 or 80 feet, and measuring from 2 to 3 feet in diameter. It grows abundantly over great part of Canada and part of the U. States. The wood is employed for laths, fences, coarse indoor work, &c. The bark is exceedingly valuable for tanning. Douglas's spruce or fir, the *A. Douglasii* of North-western America, reaches a height of 100 to 180 feet in its native forests, and has been introduced into Britain as an ornamental tree.

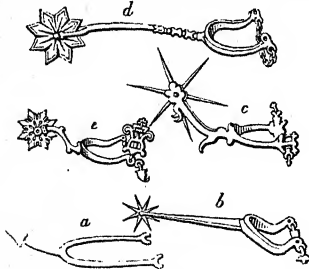
Spruce-beer, a fermented liquor made from the leaves and small branches of the spruce-fir or from the essence of spruce, boiled with sugar or molasses, and fermented with yeast. There are two kinds, the brown and the white, of which the latter is considered the best, as being made from white sugar instead of molasses. Spruce-beer forms an agreeable and wholesome beverage, and is useful as an antiscorbutic.

Spunging-house. See *Sponging-house*.

Spun-yarn, a small line or cord, formed of two, three, or more rope-yarns twisted together. The yarns are usually drawn out of the strands of old cables, and knotted together. Spun-yarn is used for various purposes, as serving ropes, weaving mats, &c.

Spur, an instrument having a rowel or small wheel with sharp points, worn on a horseman's heel, and used for goading the

horse. In early times it took the simple form of a sharp-pointed goad, the rowel first appearing in the end of the 13th century.



Ancient Spurs.

a, Frankish Spur (10th cent.). b, Brass Spur (time of Henry IV.). c, Long-necked rowel Spur (time of Edw. IV.). d, Long-necked Brass Spur (time of Henry VII.). e, Steel Spur (time of Henry VIII.).

Spurs were especially the badge of knight-hood. Hence, to win one's spurs, was to become a knight, and the phrase is now used to indicate the achievement of distinction in one's profession.

Spurge, the common name of the different species of British plants of the genus *Euphorbia*. They abound with an acrid, milky juice. The caper-spurge is the *E. Lathyris*, the oil of the seeds of which is a substitute for croton-oil; the cypress spurge is the *E. Cyparissias*, a virulent poison; the petty spurge is the *E. Peplus*, once used as a powerful purgative. See *Euphorbiaceae*.

Spurge-laurel, the *Daphne Laureola*, a shrub, a native of Britain, possessing acrid properties. See *Daphne*.

Spurgeon (spur'jin), REV. CHARLES HAD-
DON, was born at Kelvedon, Essex, in 1834; educated at Colchester; appointed usher in a school at Newmarket; engaged in church work at Cambridge; became known locally as the 'boy preacher'; accepted the pastorate of a small Baptist congregation at Water-beach while he was only eighteen; removed from thence in 1853 to a chapel in New Park Street, Southwark, which, becoming too small for his audience, required him to engage the Surrey Music Hall, and ultimately to build, in 1861, the well-known Metropolitan Tabernacle. Besides his ordinary ministrations, and the publication since 1855 of a weekly sermon, he has founded the Pastors' College, the Stockwell Orphanage, the Col-portage Association, a Book Fund, Supplementary Pastors' Aid Fund, almshouses, schools, &c. In 1887 he severed his con-

nection with the Baptist Union on what he called 'the down grade' tendency of the church. He died in 1892. He wrote numerous volumes, of which the best-known are *The Saint and his Saviour* (1867), *John Ploughman's Talk* (1868), *Feathers for Arrows* (1870), *The Treasury of David* (1872), *Types and Emblems* (1875), *The Metropolitan Tabernacle* (1876), *Farm Sermons* (1882), *The Present Truth* (1883), *Storm Signals* (1886), *Salt Cellars* (1889); and he edited the monthly magazine *Sword and Trowel*. His *Speeches at Home and Abroad* were published in 1878.

Spurn Head, a headland in the S.E. of Yorkshire, at the mouth of the Humber, 8 miles east of Grimsby. On the point are two lighthouses with fixed lights, and off the point is a light-vessel with revolving light.

Spurred Rye. See *Ergot*.

Spurrey, the common name for *Spergula*, a genus of plants, natural order Caryophyllaceae. The species are found in fields and cultivated ground, especially on sandy soils, all over the world. They have slender stems, very narrow often whorled leaves, and small white fine-petalled flowers. *S. arvensis* (corn-spurrey or yarr) is a well-known plant, growing in corn-fields. In some parts of Europe it is sown as fodder. Cattle and sheep are fond of it; hens also eat it, and are said to lay a greater number of eggs in consequence.

Spur-royal, a gold coin, first made in the reign of Edward IV. In the reign of James I. its value was 15s. It was so named from having on the reverse a sun with four cardinal rays issuing from it so as to suggest a resemblance to the rowel of a spur. Sometimes written *spur-rial* or *spur-ryal*.

Spur-wheel, in machinery, a wheel in which the teeth are perpendicular to the axis, and in the direction of radii. A train of such wheels working into each other is called *spur-gear*.

Spur-wing, the English name for a species of wading-birds of the genus *Parra* (see *Jacana*), having the wing armed with a bony spur. They inhabit Africa and South America. The name is also given to the species of geese of the genus *Plectropterus*. They are natives of Africa, and have two strong spurs on the shoulder of the wing.

Spurzheim (spurts'him), JOHANN FRIED-
RICH KASPAR, German phrenologist, born at Treves 1776; died 1832. He received a medical education at Vienna, where he

became acquainted with Dr. Gall, who at this time began to teach his doctrine of phrenology, and with whom he travelled on a lecturing tour (1805) through Germany, France, and Denmark. In 1813 Spurzheim visited England alone, where he popularized the new doctrine. He went to America in 1832, and it was while lecturing in Boston that he died. Among his published writings are: *The Physiognomical System of Drs. Gall and Spurzheim* (1815), *Essai Philosophique sur la Nature Morale et Intellectuelle de l'Homme* (1820), *Elementary Principles of Education* (1821), and *the Anatomy of the Brain* (1826).

Spy, a secret emissary sent into the enemy's camp or territory to inspect their works, ascertain their strength and their intentions, to watch their movements, and report thereon to the proper officer. By the laws of war among all civilized nations a spy is subjected to capital punishment.

Spy-Wednesday, an old name given to the Wednesday immediately preceding Easter, in allusion to the betrayal of Christ by Judas Iscariot.

Squad, a small body of troops assembled for drill, inspection, or other purposes. The *awkward squad* is composed of those recruits who have not received sufficient training to take part in regimental drill.

Squadron, the principal division of a regiment of cavalry. The actual strength of a squadron varies with that of the component troops, but it ranges from 120 to 200 sabres. A squadron is divided into two troops, each of which is commanded by its captain. Each regiment of cavalry consists of three or four squadrons. The term is applied also to a division of a fleet, being a detachment of ships of war employed on a particular service or station, and under the command of a commodore or junior flag-officer.

Squa'lidae, a family of elasmobranchiate fishes, which includes the various species of sharks. The type of this family is the Linnaean genus *Squalus*. See *Shark*.

Squama'ta, the division of reptiles comprising the Ophidia (snakes) and Lacertilia (lizards), in which the integument develops horny scales, but there are no dermal ossifications.

Squamipen'nes, a family of acanthopterygious (teleostean) fishes, so named on account of their fins being covered with scales, not only on the parts which have soft rays, but frequently also on those that have spinous ones. They are chiefly small fishes, abun-

dant in the seas of hot climates, and of the most beautiful colours. They frequent rocky shores, and their flesh is, generally speaking, very wholesome and palatable. Called also *Chatodontida*.

Square, in geometry, a quadrilateral figure, both equilateral and equiangular, or, in other words, a figure with four equal sides and equal angles. In measuring superficial areas it is only necessary to multiply one side by itself to have the area of the square, because each of the sides may be considered as the basis or as the perpendicular height. Thus a square the sides of which measure 4 feet is equal to 16 square feet, that is, sixteen squares each 1 foot high and 1 foot long. To *square* a figure (for example, a polygon) is to reduce the surface to a square of equivalent area by mathematical means. It has often been attempted to square the circle, but this cannot be done. In arithmetic and algebra the *square* of a number is the number or quantity produced by multiplying a number or quantity by itself. Thus 64 is the square of 8, for $8 \times 8 = 64$.

Square, in military tactics, a body of infantry formed into a rectangular figure with several ranks or rows of men facing on each side, with officers, horses, colours, &c., in the centre. The front rank kneels, the second and third stoop, and the remaining ranks (generally two) stand. This formation is usually employed to resist a cavalry charge. Hollow squares are frequently formed with the faces fronting inwards when orders and instructions, &c., are to be read, and the like.

Square-rigged, a term applied to a vessel carrying chiefly square sails, that is, whose principal sails are extended by yards suspended by the middle, and not by stays, gaffs, booms, and lateen yards. Thus a ship and a brig are *square-rigged* vessels.

Square Root. See *Root*.

Square-sail. See *Square-rigged*.

Squash, a plant of the genus *Cucurbita* (*C. Melopepo*) and its fruit, cultivated in America as an article of food. The name is also given to other species. See *Gourd*.

Squash-bug, a name given in N. America to several hemipterous insects, best known as destroyers of squash, pumpkin, and other plants.

Squati'na, a genus of cartilaginous fishes somewhat akin to the rays. The *S. angelus* is the angel-fish or monk-fish. See *Angel-fish*.

Squatter, a person that settles on a piece of land, particularly on public land, without a title. In Australia the term is also applied to one who occupies an unsettled tract of land as a sheep-farm under lease from government at a nominal rent. The word is sometimes used in a looser and wider sense.

Squaw-root, a singular scaly plant (*Conopholis americana*, nat. order Orobanchæ), a native of America, found growing in clusters among fallen leaves in oak woods.

Squeteague (skwe-tēg'), an American fish, the *Otolithus regalis* of Cuvier, very common in the waters of Long Island Sound and adjacent bays, where it is captured in large quantities for the table. It produces a dull sound like that of a drum.

Squib, a little pipe or hollow cylinder of paper filled with gunpowder or other combustible matter which being ignited it flies along, throwing out a train of fiery sparks, and bursting with a crack.

Squid, a popular name of certain cuttle-fishes belonging to the dibranchiate group of the class Cephalopoda, and included in several genera, of which the most familiar is that of the calamaries. See *Calamary*.

Squill, a plant of the genus *Scilla*, nat. order Liliaceæ, nearly allied to the hyacinths, onions, &c. Two species are indigenous to Britain—*S. verna*, very abundant

on the cliffs of Cornwall, and frequent also in the Orkney and Shetland Isles, and *S. autumnalis*, which grows also in Cornwall and in other parts of England, not being confined to the sea-shore. The term squill is more particularly applied to the *Scilla maritima* (*Urginea Scilla*), official squill or sea-onion, which has a large acrid bulbous root like an onion. It is a native of the sandy shores of the Mediterranean. The bulb has been known as a medicine from the earliest ages, and is still used as a diuretic and expectorant. In large doses it causes vomiting, purging, and may even prove fatally poisonous.

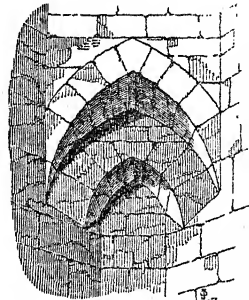
Squilla, a genus of crustaceans, order Stomatopoda, the type of the family Squillidæ, having the body long and semi-cylindric, somewhat resembling that of a lobster. The



Squill (*Scilla maritima*).

shell consists of a single shield of an elongated quadrilateral form, covering the head, the antennæ and eyes excepted, which are placed on a common anterior articulation. The best known of the numerous species is the locust shrimp, mantis-crab, or mantis-shrimp (*S. mantis*) of the Mediterranean.

Squinch, **SCONCE**, in architecture, a small pendentive arch (or several combined) formed



Squinch, Maxstoke Priory, Warwickshire.

across an angle, as in a square tower to support the side of a superimposed octagon.

Squint, in architecture, an oblique opening passing through the walls of many old churches, usually constructed for the purpose of enabling a person in the transepts or aisles to see the elevation of the host at the high altar. Generally they are not above a yard high and 2 feet wide, but sometimes they form narrow arches 10 or 12 feet in height, as at Minster-Lovell, Oxfordshire. The name *hagioscope* is sometimes applied to them.

Squinting, or **STRABISMUS**, a defect of the eyes owing to which they cannot both be brought to bear upon the same object at once. It is usually due to one of the lateral muscles of the eye having a longer pull than the other. It may also arise from paralysis of one muscle caused by a blow. There are several kinds of squint, the two chief being inward or convergent and outward or divergent, the axes of the eyes in the one case tending to meet, in the other to separate. For persons so affected, and especially children, it is well not to look too long at small objects or read in ill-lighted rooms, and glasses to correct the sight should be obtained. It is also a good thing to have the sound eye (when there is but one squinting eye) bandaged up for a short time each day. When these measures fail the muscle can

be lengthened by means of a simple surgical operation.

Squirrel, a small rodent mammal of the family Sciuridæ, the type of which is the genus *Sciurus*, or true squirrels. This family comprehends three groups—the true squirrels (*Sciurus*), the ground-squirrels (*Tamias*), and the flying-squirrels (*Pteromys* and *Sciuropterus*). The true squirrels are distinguished by their strongly compressed inferior incisors and by their long bushy tail. They have four toes before and five behind. The thumb of the fore-foot is sometimes marked by a tubercle. They have in all four grinders, variously tuberculated, and a very small additional one above in front, which very soon falls. In colour they are usually of a rich ruddy brown on the upper parts, merging into reddish or grayish-white on the under parts of the body, but the fur varies with the season and climate so that in winter it may be of a gray appearance. The head is large, and the eyes projecting and lively. Several species are enumerated, as the common squirrel, which inhabits Europe and the north of Asia; while the cat-squirrel, gray-squirrel, black squirrel, red squirrel, and the great-tailed squirrel are American species. The common British squirrel (*Sciurus vulgaris*) and several other species are remarkably nimble, running up trees and leaping from branch to branch with surprising agility. They subsist on nuts, acorns, seeds, &c., of which they lay up a store for winter, some of them in hollow trees, others in the earth. Their nest, which consists of woody fibre, leaves, and moss, is usually situated in a fork of a tree, and the young, of which there are three or four, are born in June. When engaged in eating they sit on their haunches with their tail thrown upwards on the back, grasp the eatables with their fore-paws, and gnaw with their powerful teeth. The fur of some of the American species is an article of commerce. See also *Ground-squirrel* and *Flying-squirrel*.

Squirrel-corn, the American name for the fragrant plant *Dicentra canadensis*, nat. order Fumariacæ or fumitory.

Squirrel-monkey, a monkey of the genus *Callithrix*, inhabiting Brazil, resembling in general appearance and size the familiar squirrel. A well-known species is the *C. Sciuureus*, which is coloured grayish olive, the under surface being gray, the ears white, and the tail tipped with black.

Squirrel-cucumber, one of the popular

names of the fruit of *Eoballium agreste*, a plant of the gourd family inhabiting Europe, which, when nearly ripe, separates suddenly from the peduncle, at the same time ejecting its juices and seed. See *Eluterium*.

Squitch. See *Couch Grass*.

Srinagar, a city, the capital of the state of Cashmere, in the Western Himalayas, situated in the valley of Cashmere, on both banks of the Jehlum. The city extends along the river for about 2 miles, and is exceedingly picturesque, although on nearer approach the streets are found to be narrow and dirty. The Jama Masjid, a large mosque said to be capable of containing 60,000 persons, is situated in the city, and in the environs are beautiful gardens, and the lake mentioned in Moore's *Lalla Rookh*. Srinagar has manufactures of shawls, paper, leather, firearms, otto of roses, &c. Pop. 122,536.

Stabat Mater (L. 'the mother stood'), the first words, and hence the name, of a mediæval hymn still sung in the ecclesiastical services of the Roman Catholic Church during Holy Week, and at the festival of the Seven Dolours of the Virgin Mary. It was written in 1268 by an Italian Franciscan friar named Jacobus de Benedictis. It has been set to music by Pergolesi, Rossini, and other famous composers.

Stability, in physics, a term applied to that condition of a body in which, if its equilibrium be disturbed, it is immediately restored, as in the case when the centre of gravity is below the point of support. See *Equilibrium*.

Stacca'to, in music, disconnected; separated; a direction to perform the notes of a passage in a crisp, detached, distinct, or pointed manner. It is generally indicated by dots or dashes placed over the notes, the dash implying the strongest or most marked degree of staccato or crispness. A certain amount of time is subtracted from the nominal value of any note performed staccato.

Stachys (stak'is), a genus of plants belonging to the natural order Labiatæ. The species are very numerous, and are widely distributed through the temperate regions of the globe. Four species are British, and are known under the name of *woundwort*.

Stack-stand, a basement of wood or iron raised on props (of iron, stone, or wood), on which a stack, especially a stack of some kind of grain, is built for the purpose of keeping it dry or excluding vermin. There is usually also a hollow upright cone of

wood or iron to assist in ventilating the interior of the stack.

Stac'te, one of the sweet spices which composed the holy incense of the ancient Jews, perhaps storax. Exod. xxx. 34.

Stade (stá'dé), a town of Prussia, province of Hanover, on the Schwinge, about 4 miles above its confluence with the Elbe, 21 miles west of Hamburg. It has some shipping and trade. The Stade dues, a toll charged on all cargoes shipped to Hamburg, used to be levied here until they were abolished in 1861. Pop. 10,545.

Stadium, in ancient Greece, a course set apart for foot-races and other athletic contests, especially the course at Olympia, in Elis. The Olympian stadium was rectangular, but most stadia had one end semi-circular. The length of the part marked off for the race was always 600 feet, but the foot varied. The Olympian course had a length of about 681 English feet. This length, also called a stadium, was adopted as a standard for itinerary measurement, and was so used by the Romans. It was equal to 625 Roman feet, or 125 Roman paces, and 8 stadia were equal to one Roman mile.

Stadtholder (Dutch, *Stadhouder*, 'city-holder'), a title given in the Netherlands to the governor of a province who was also commander-in-chief of the forces. This title, however, received its special significance in 1580, when the provinces of Holland and Zealand revolted against the authority of Spain, and unitedly accepted William, prince of Orange, as their stadtholder. The prince was assassinated before he was formally invested with this office, but the title was conferred on his son, Prince Maurice, and remained as the hereditary title of the chief of the state until Holland was annexed by France in 1802. This title was dropped in 1814, when the Prince of Orange was declared king of the Netherlands.

Staël-Holstein, ANNE LOUISE GERMAINE NECKER, BARONESS DE, the only child of Necker, banker and minister of finance to Louis XVI., was born in 1766, and died in 1817. Her education was directed with puritanical severity by her mother, but this was counteracted by the tender indulgence of her father, who encouraged his daughter to converse with the eminent philosophers who frequented his house. In 1786 she married Baron de Staël-Holstein, Swedish ambassador at the French court. The marriage was not very happy, and she lived for a time apart from her husband. In 1788

she printed her *Lettres sur les Écrits et le Caractère de J. J. Rousseau*. At the outbreak of the revolution (1789) she exercised considerable political power by reason of her father's high position at court, and her own wit and womanly charm; but during the Reign of Terror she fled to Coppet (1792), her father's estate in Switzerland, after vainly endeavouring to save her friends and the royal family. In 1793 she sought refuge in England, where she published *Reflections on the Trial of the Queen*, and *Reflections on the Peace*. During the Directory Madame de Staël-Holstein returned to Paris, where she again became an influence in politics, and published her essay on the *Passions*. Subsequently she was banished by Napoleon on account of her bold advocacy of liberal views, and her wanderings through Europe are described in her *Ten Years of Exile (Dix Années d'Exil)*. Her other writings comprise *De la Littérature Considérée dans ses Rapports avec les Institutions Sociales*; *Delphine* (1802); *Corinne ou l'Italie* (1807), a novel in which Italian life and scenery are exhibited with thorough knowledge, her most popular work; a work on Germany, *De l'Allemagne* (1810); and *Considérations sur les Principaux Événements de la Révolution Française* (1818). Her first husband died in 1802, and it was found at her death that she had secretly married a M. de Rocca in 1812.

Staff, a body of officers whose duties refer to an army or regiment as a whole, and who are not attached to particular subdivisions. The *chief of the general staff* is the first military member of the Army Council in Britain, and has charge of a department concerned with the military defence of the empire, the collection of intelligence, the training of the forces, war organization, the selection and administration of the general staff, &c. Under him there are a *director of military operations*, a *director of staff duties*, and a *director of military training*. The *adjutant-general to the forces* is second military member of the council, and has charge, among other things, of the departmental staff. The *quartermaster-general to the forces* and the *master-general of the ordnance* are the other military members of the council. An army in the field has a *general staff*, *army corps staffs*, *brigade staffs*, &c. Aides-de-camp and secretaries to general officers constitute the *personal staff*. There is a Staff College at Camberley. A *regimental staff*, consisting of adjutant,

quartermaster, paymaster, &c., is attached to each regiment.

Staff, in music, the five parallel lines and their intermediate spaces, on which the notes, sharps, flats, and other musical characters are placed. See *Music*.

Staff, BISHOP'S. See *Crosier*.

Staffa, a small uninhabited island of the Hebrides, belonging to Argyleshire, situated some 6 miles N. of Iona, 7 miles from the nearest point of Mull, and about 55 miles W. of Oban by steamer; $1\frac{1}{2}$ miles in circuit; greatest height, 144 feet. The island is covered by a rich soil affording excellent pasture, but it is best known because of its precipitous basaltic cliffs rising in columnar form, and its caves. The largest of these, Fingal's, or the Great Cave, has an entrance 66 feet high at mean tide, a breadth of 42 feet at entrance, and extends backwards 227 feet. Its sides are composed of basaltic columns, from the roof hang clusters of short columns whitened by calcareous stalactite, while the floor is covered by the sea to the depth of 18 feet at the entrance. The most noteworthy of the other caves is called Clam-shell Cave, from the peculiar curve in which the basaltic columns recline. It is 30 feet in height, 16 to 18 feet broad, and 180 feet long.

Staff-college, a military institution of England, at Camberley, Surrey, founded in 1858 for the instruction of officers who desire to be placed upon the staff. The candidate must have been in active service for five years; must produce a certificate as to character and efficiency from his commanding officer; a certificate of good health and fitness for active duties from a military surgeon; and a certificate of having passed the examination for the rank of captain. He is then submitted to a competitive examination in mathematics, fortification, military topography, military law, tactics, and one foreign language, and if successful he undergoes a two years' study in those and other subjects, during which time he receives his regimental pay. At the end of the course there is a final examination.

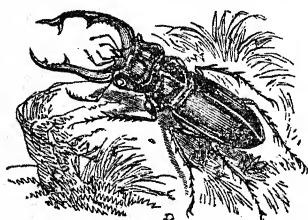
Stafford, a municipal and parliamentary borough of England, the county town of Staffordshire, situated on the River Sow, about 130 miles N.W. of London. It is pleasantly situated and well built; has a county-hall, free library, museum, and a theatre; while its chief places of interest are the two old churches of St. Mary and St. Chad. The principal industries are the

making of boots and shoes, tanning, and engineering. Since 1885 Stafford sends one member to parliament, instead of two, as formerly. Pop. 20,895.—The county is one of the central counties of England, and is bounded by Cheshire, Derbyshire, Warwickshire, Worcestershire, and Shropshire; greatest length from north to south, 50 miles; central breadth, 35 miles; area, 749,602 acres, or 1171 square miles. The surface in the north consists chiefly of wild moorlands, rising in several parts more than 1000 feet above sea-level, while the midland and southern parts consist for the most part of level and fertile lands. The Trent, which has for tributaries the Sow, Tame, Blythe, and Dove, traverses the county from north-west to south-east. The geological formation most common, especially in the central part of the county, is the new red sandstone, but there are also two valuable coal-fields—one in the north called the Pottery coal-field, and the other in the south, usually known as the Dudley coal-field, which is remarkable for the thickness and richness of its seams. About three-fourths of the whole surface is arable; much of the soil is of a cold, clayey nature, fit only for moorland oats, and the best lands are in the south. The chief industries are coal-mining, iron-ore mining, smelting, and manufacturing, and North Staffordshire is the chief centre in the kingdom for the various earthenware manufactures. The county is well supplied with railways and canals. The principal towns are Stafford, Lichfield, Walsall, Wolverhampton, Burton-on-Trent, Stoke-on-Trent, W. Bromwich, Wednesbury, Longton, Hanley, Burslem, and Newcastle-under-Lyme. The county is divided politically into seven divisions, viz. Leek, Burton, Western, North-western, Lichfield, Kingswinford, and South-eastern, each of which sends one member to the House of Commons. Pop. 1,234,506.

Stag, or RED-DEER, a large and handsome deer (*Cervus eläphus*) which is a native of Europe and Northern Asia, and in Britain is now found wild only in the Highlands of Scotland. In summer the back and flanks of the stag are of a reddish-brown colour, while these parts in winter are gray-brown. A full-sized male stag with antlers well developed stands about 4 feet high at the shoulder, and has horns 3 feet in length, while the female is smaller and has no horns. They feed on grass, buds and young shoots of trees, and in winter they roam in herds.

The pairing season occurs in August, and the calf is dropped in May. The male is known distinctively as the hart (or stag), the female as the hind. The stag is represented in North America by the wapiti (*Cervus canadensis*), which is even larger. See *Wapiti*.

Stag-beetle, a name of lamellicorn beetles of the genus *Lucanus*, family Lucanidae. The common stag-beetle (*Lucanus cervus*) is one of the largest of British insects, and is



Stag-beetle (*Lucanus cervus*).

especially distinguished by the enormous size of the horny and toothed mandibles in the males. It is common in some localities in the neighbourhood of London, and is often 2 inches long, of a black colour.

Stage, a platform elevated above the ground, and specifically applied to the raised floor upon which theatrical performances are exhibited. See *Theatre*.

Stage-coach. See *Coach*.

Staggers is the vague and popular name of certain diseases of horses and sheep. In the horse *mad* or *sleepy* staggers is due to inflammation of the brain, while *grass* or *stomach* staggers arises from acute indigestion, generally the result of overfeeding on wet grass. In sheep the staggers is caused by the presence within the brain of the immature embryo of a species of tape-worm (*Tænia Cœnurus*), which, in its mature state, is found in the intestines of the dog.

Staghound, a large and powerful kind of hound formerly used in Europe for hunting the stag or red-deer, and now nearly extinct. It was bred, as is supposed, from the bloodhound and greyhound. The modern staghound is a variety of the foxhound.

Stahl (stäl), FRIEDRICH JULIUS, born at Munich 1802, died 1861. He was educated at Würzburg, Heidelberg, and Erlangen, and became professor of jurisprudence in the latter place, and at Berlin in 1840. He was a leader of the aristocratic party in the Prussian diet, and the author of *Philosophie*

des Rechts, Ueber den Christlichen Staat, and Was ist Revolution?

Stahl, GEORG ERNST, a German physician and chemist, born 1660, died 1734. He studied at Jena in 1687, became physician to the Duke of Saxe-Weimar; in 1691 was chosen second professor of medicine at Halle; and in 1716 was appointed physician to the King of Prussia. Stahl was the author of a theory that there resides in the human body a vital force composed of pure fire, and this element he named *phlogiston*. This theory and the medical treatment founded upon it were discredited by the discoveries of Priestley and Lavoisier. His principal works are *Experimenta et Observationes Chymicæ et Physicæ*; *Disputationes Medicæ*; *Theoria Medica vera*; *Fundamenta Chymicæ Dogmaticæ et Experimentalis*.

Stahr (stär), ADOLF WILHELM THEODOR, German writer, born 1805, died 1876. He was educated at Halle, and was for a number of years co-rector of the gymnasium at Oldenburg, but latterly resigned this post on account of ill health, and settled in Berlin. His earlier works were connected with Aristotle and his philosophy, but latterly his literary activity extended over a wide field. His works include translations from Aristotle; books on art, travel, and literary and general history, as *Torso: Art, Artists, and Art-works of the Ancients*; *Lessing, his Life and Works*; *Goethe's Female Characters*; *The Prussian Revolution*; *Weimar and Jena*; *A Year in Italy*; *Paris Studies*; *A Winter in Rome*; *Pictures from Antiquity*, &c. In 1854 he married Fanny Lewald, who was also known as an authoress.

Stained-glass is glass painted with metallic oxides or chlorides, ground up with proper fluxes and fused into its surface at a moderate heat. See *Glass-painting*.

Stainer, SIR JOHN, Mus. Doc., born in 1840, at sixteen was appointed organist of St. Michael's College, Tenbury, then in 1859 of Magdalen College, Oxford, and in 1872 of St. Paul's. At Oxford he graduated in arts and music. He was knighted in 1888, in 1889 became professor of music at Oxford, and died in 1901. He was inspector of music to the Educational Department; wrote the oratorio *Gideon* (1875); the cantatas *The Daughter of Jairus*, *Mary Magdalene*, the *Crucifixion*; a treatise on the *Theory of Harmony* (1871); *Music of the Bible* (1879); joint-author with W. A. Barrett of *Dictionary of Musical Terms* (1876); and editor of the well-known *Music Primers*.

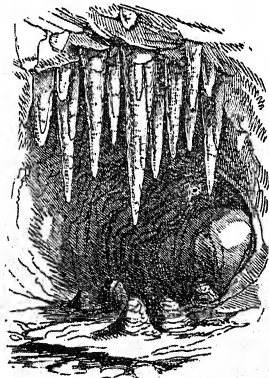
Staines, an old market-town of England, in Middlesex, on the Thames, 6 miles from Windsor, and about 19 miles s.w. of London. Pop. 6688.

Stair, *LORD*. See *Dalrymple*, *James* and *John*.

Stairs, a succession of steps raised one above the other, affording means of communication between two points at different heights in a building, &c. Originally the stairs were placed from story to story in straight flights like ladders, and were often external, being sheltered by a projection from the roof, but to save space the spiral form was adopted, the stair being contained in a cylindrical building projecting from the outside of the edifice. In this construction a central axis or *newel* reaching from the ground to the roof serves to support the inner ends of the steps, and the outer ends are let into the walls. The spiral form is still used in certain circumstances; but the finest stairs are now constructed in straight sections separated from each other by a wide step or platform called a *landing*. The separate division, open space, or apartment in which the stair is placed is called the *staircase*.

Stake-net, a form of net for catching salmon, consisting of a sheet of net-work stretched upon stakes fixed into the ground, generally in rivers or firths, where the sea ebbs and flows, with contrivances for entangling and securing the fish.

Stalactites, masses of calcareous matter,



Cave with Stalactites and Stalagmites.

usually in a conical or cylindrical form, pendent from the roofs of caverns, and produced

by the filtration of water containing particles of carbonate of lime through fissures and pores of rocks. Similar masses of small size are frequently to be seen also depending from stone bridges. The water being evaporated leaves a deposit of lime behind it, which, by the continued trickling of the water, gradually increases in size. Simultaneously with the formation of the stalactite a similar but upward growth, called a stalagmite, takes place at the spot vertically below where the successive drops of water fall and evaporate. This sometimes forms continuous sheets over the surface, sometimes rises into columns, which meet and blend with the stalactites above.

Staleybridge. See *Stalybridge*.

Stalimens (stă-lim'e-nă). See *Lemnos*.

Stalk-eyed Crustacea, in zoology, applied to certain crustacea named Podophthalmata, which have the eyes set at the end of footstalks of variable length. The lobster, shrimp, and crab are examples of this group.

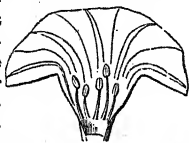
Stall, a fixed seat inclosed, either wholly or partially, at the back and sides, in the choir or chancel of a cathedral, collegiate church, &c., and mostly appropriated to some dignitary of such churches.

Stalybridge, or **STALEYBRIDGE**, a municipal and parliamentary borough of England, in the counties of Lancaster and Chester, $7\frac{1}{2}$ miles east of Manchester, on both banks of the Tame. The principal public buildings are the town-hall, the free library, the post-office, and St. George's church, an octagonal building. Spinning cotton yarns and weaving calicoes are the principal manufactures; but there are also iron-foundries, machine and mill-wright shops, &c. Stalybridge returns one member to parliament. Pop. (municipal), 27,673; (parliamentary), 46,557.

Stamboul. See *Constantinople*.

Stamens, in botany, the male organs of fructification in plants, formed principally of cellular tissue. They are situated immediately within the petals, and are each composed, in most cases, of three parts, the filament, the anther, and the pollen (contained in the anther), of which the two latter are essential, the other not. The stamens and pistil constitute the sexual or reproductive organs of plants. Generally they both exist in the same flower, which is thus said to be *hermaphrodite* or *perfect*. The number of stamens varies in different plants, from one to a hundred or more. Their insertions with regard to the ovary

are said to be *hypogynous*, *epigynous*, or *perigynous*; stamens adherent to petals are described as *epipetalous*; those adherent to the pistil are *gynandrous*. If all the stamens of a flower have adherent filaments, they are *monadelphous*; if they form two bundles, they are *diadelphous*; when the anthers only adhere, the stamens are *syngenesious*. See *Botany*, *Anther*, *Pollen*.



Inside of Corolla, showing the Stamens.

Stamford, a market town and municipal borough of England, partly in Northamptonshire but mainly in Lincolnshire, on the Welland, about 12 miles north-west from Peterborough. It is an ancient and irregularly built town, containing interesting churches, of which St. Mary's (erected at the end of the 13th century) exhibits some fine specimens of early English architecture, and St. John the Baptist's (middle of the 15th century) has a fine wooden roof and screen. There are manufactures of agricultural implements, and a considerable malting business is carried on. By the act of 1885 it ceased to have a separate parliamentary representation. Pop. 8229.

Stamford, a town of the U. States, in Fairfield county, Connecticut, near the mouth of the Mill River, 36 miles north-east of New York, for the inhabitants of which it is a favourite summer resort. It has woollen and iron manufactures, and a small coasting trade. Pop. 18,839.

Stammering, an affection of the faculty of speech characterized by irregular, imperfect, or spasmodic actions of the muscles concerned in articulation. It manifests itself in a difficulty in beginning the enunciation of words, especially such as begin with an explosive consonant, or in a spasmodic and for a time an uncontrollable reiteration of the same syllable after the word is begun; this latter defect being also called *stuttering*. Stammering is always increased by emotional disturbance, and is much mitigated, and often cured, by the patient acquiring confidence in himself, never attempting to speak in a hurry or when the chest is empty of air, or by reading measured sentences slowly and with deliberation.

Stamp, a term specifically applied to the public mark or seal made by a government or its officers upon paper or parchment whereon private deeds or other legal

agreements are written, and for which certain charges are made for purposes of revenue. The name is also applied to a small piece of stamped paper issued by government, to be attached to a paper, letter, or document liable to duty. See *Stamp-duty*.

Stamp-act, an act for regulating the imposition of stamp-duties; especially, an act passed by the British parliament in 1765, imposing a duty on all paper, vellum, and parchment used in the American colonies, and declaring all writings on unstamped materials to be null and void. This act roused a general opposition in the colonies, and was one cause of the revolution.

Stamp-duty, a tax or duty imposed on pieces of parchment or paper, on which many species of legal instruments are written. (See *Stamp*.) In Britain stamp-duties on legal instruments used to be chiefly secured by prohibiting the reception of them in evidence unless they bore the stamp required by the law. By the Customs and Inland Revenue Act (1888), however, the not stamping of bonds, conveyances, leases, mortgages, or settlements, is held to be an offence punishable by a fine of £10, and payable by the vendee, transferee, lessee, mortgagee, &c. The same act alters from twelve to three months the period, after the execution of a legal document, within which the inland revenue authorities may remit the penalties on an unstamped instrument.

Standard, a flag or carved symbolical figure, &c., erected on a long pole or staff, serving as a rallying-point or the like. In a more strict sense the term is applied to a flag which bears the arms, device, or motto of the owner, long in proportion to its depth, tapering towards the fly, and, except when belonging to princes of the blood-royal, slit at the end. The so-called British royal standard is more correctly a banner, being a square flag, and having its whole field covered solely by the national arms. The cavalry standards are also, properly speaking, banners, and are of small size, of a colour corresponding to the regimental facings, and charged with the cipher, number, insignia, and honours of the regiment. The infantry corresponding flags are called *colours*.

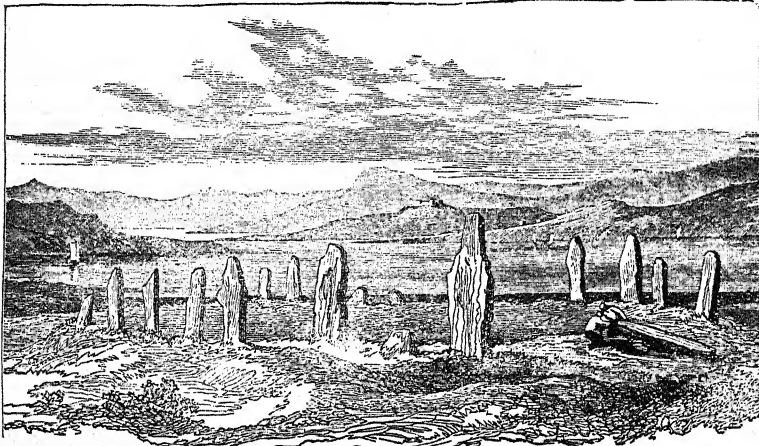
Standard, **BATTLE OF THE**, a battle in which David I. of Scotland, who had espoused the cause of Maud against Stephen, was signally defeated by the English under the Bishop of Durham. It was fought in the neighbourhood of Northallerton, in

Yorkshire, on the 22d of August, 1138, and it got its name from the fact that the English forces were gathered round a tall cross mounted on a car, and surrounded by the banners of St. Cuthbert, St. Wilfred, and St. John of Beverley.

Standard, THE, London daily newspaper founded in 1827. It is independently Conservative in politics, and has a large circulation. An evening edition, under the name of *Evening Standard*, is published.

Standard of Money, in coinage, the proportion of weight of fine metal and alloy established by authority. The standard of gold coins in Britain is at present 22 carats, that is, 22 parts of fine gold and 2 of alloy; and the sovereign should weigh 123·274 grains troy. The standard of silver coins is 11 ounces 2 dwts. of pure silver and 18 dwts. of alloy, making together 1 lb. troy: and the shilling should weigh 87·272 grains.

Standing Orders, the orders made by



Standing Stones of Stennis, Pomona, Orkney.

either house of parliament, or other deliberative assembly, respecting the manner in which business shall be conducted in it. These regulations may be rescinded or suspended by resolution of the body, when it is desired to expedite some business. The standing orders of the House of Commons have latterly been considerably modified.

Standing Stones are large rough, erect monoliths found not only in all parts of Europe, but also in some countries of the East and even in the New World, and nowhere more common than in Great Britain. They sometimes occur singly, sometimes in groups. The principal purposes of the single standing stones appear to have been to serve as boundary-marks, as memorials of battle, and as sepulchral monuments. A number of these single standing stones are perforated, such as the stone which stands in the centre of a circle at Applecross, in the west of Ross-shire; the Clachcharra, or stone of vengeance, at Onich, near Ballachulish, Ar-

gyleshire; and another called the Stone of Odin, near the circle of Stennis, in the island of Pomona, in Orkney. The groups of standing stones that exist in various parts of Great Britain, as well as in some parts of the Continent, were thought by antiquaries to be connected with the Druidical worship of the Celts, but, for want of sufficient evidence, this theory has been abandoned. The best preserved of these groups are those of Avebury and Stonehenge in Wiltshire; that of Carnac in Brittany; that of Callernish, near Loch Roag, in Lewis, in the Hebrides; and the circles of Brogar and Stennis in Pomona in Orkney. See *Avebury*, *Carnac*, *Stennis*, and *Stonehenge*; also *Cromlech*, *Dolmen*, *Monolith*, and *Sculptured Stones*.

Standish, MILES, born in Lancashire about 1584, died 1656. He claimed to be the descendant of the Standish family of Duxbury Hall, served as a captain in the Netherlands, and joined the Puritans when they sailed for New England in the *May*.

flower (1620). He took an active part in the early struggles of the colony, and a tradition regarding his courtship is celebrated in a well-known poem by Longfellow.

Stanfield, CLARKSON, marine painter, born of Irish parents at Sunderland in 1793, died 1867. He began life as a sailor; occupied his spare time in sketching; received an engagement to paint scenery for the Royalty Theatre, London; became scene-painter at Drury Lane in 1822; abandoned scene-painting in 1834; became A.R.A. in 1832, R.A. in 1835. Among his pictures may be mentioned: Mount St. Michael (1830), The Battle of Trafalgar (1836), The Body of Nelson towed into Gibraltar (1853), The Abandoned (1856).

Stanford, SIR CHARLES VILLIERS, English composer, born at Dublin 1852, became organist of Trinity College, Cambridge; graduated with honours in classics, 1874; studied at Leipzig and Berlin; became professor of composition and orchestral playing at Royal College of Music, 1883; professor of music at Cambridge, 1887; conductor of Bach Choir, 1885-1902, and of Leeds Philharmonic Society since 1897; knighted in 1902. His chief works are the operas: The Veiled Prophet of Khorassan (1881), Savonarola (1884), Shamus O'Brien (1896), and Much Ado about Nothing (1901); settings of Tennyson's *Revenge* (1886), Whitman's *Death of Lincoln* (1884), Browning's *Cavalier Songs* (1884), Gray's *The Bard* (1895), and Henley's *The Last Post* (1900); the oratorios, *The Three Holy Children* (1885) and *Eden* (1891); several symphonies; a *Diamond Jubilee Te Deum* (1898); several songs; &c.

Stanhope, the name of a noble English family. **JAMES**, first earl Stanhope, was born 1673, died 1721. He entered the army, served as brigadier-general under the Earl of Peterborough at the capture of Barcelona in 1705, was appointed commander-in-chief of the British forces in Spain, and in 1708 took Port Mahon. He became the favourite minister of George I. —**CHARLES**, the third earl, grandson of the preceding, 1753-1816, was an inventor, a patron of science, and an advocate of republicanism. His chief inventions were an arithmetical machine and a printing-press. —**PHILIP HENRY**, fifth earl, and grandson of the preceding, was born in 1805, and died in 1875. He filled various official positions in the ministry of Sir Robert Peel, but he was best known, under his

title of Lord Mahon, as the author of a *History of the Succession War in Spain* (1832), a *History of England from the Peace of Utrecht to the Peace of Versailles* (1854), a *Life of Pitt* (1861), and a *History of the Reign of Queen Anne* (1870). He was the founder of the Stanhope prize at Oxford for a historical essay. —**LADY HESTER LUCY**, daughter of the third earl Stanhope, was born in London in 1776, and died in Syria 1839. For some years she resided with her uncle, William Pitt, and when he died in 1806 she received a government pension of £1200. In 1810 she left England, visited various places in the East, and finally settled in Syria. She established herself in the deserted convent of Mar Elias in the Lebanon, adopted the style and dress of an Arab chief, and by her kindness and masculine energy exercised great influence over the Bedouins. Her *Memoirs* were published in 1845-46.

Stanhope, PHILIP DORMER. See *Chesterfield*.

Stanislau, a town of Austria, in Galicia, on the Bistritz, 74 miles S.E. ofemberg, with railway works, tanneries, &c. Pop. 30,410.

Stanislaus Augustus, STANISLAUS II., the last king of Poland, son of Count Stanislaus Poniatowski, was born in 1732, died in 1798. Sent by Augustus III. of Poland on a mission to St. Petersburg, he became a favourite with the grand-princess (afterwards the Empress Catherine), by whose influence he was crowned king of Poland at Warsaw in 1764. The nobility, however, objected, and compelled the king to abdicate (1771). He protested against the various partitions of Poland, formally resigned his sovereignty in 1795, and finally died in St. Petersburg as a pensioner of Paul I.

Stanislaus Leszczynski (Iesh-chin'ski), STANISLAUS I., King of Poland, was born in 1677, and died in 1766. His father was grand treasurer to the Polish crown, and he himself was voivode of Posen, when he was recommended to the Warsaw assembly by Charles XII. of Sweden as a candidate for the vacant throne of Poland. He was accordingly elected and crowned (1705), but after the disastrous battle of Poltava (1709), when his patron Charles XII. was defeated, he had to flee from Poland. He found refuge in France ultimately, where his daughter Maria became wife to Louis XV. Assisted by the French king he sought to establish his claim to the throne of Poland in 1733,

STANLEY.

but, opposed by the united powers of Saxony and Russia, he had again to retire into France, where he held possession of the duchies of Lorraine and Bar until his death. His writings were published under the title of (*Euvres du Philosophe Bienfaisant* (1765).

Stanley, REV. ARTHUR PENRHYN, D.D., second son of Edward Stanley, rector of Alderley, afterwards bishop of Norwich, was born at Alderley, Cheshire, 1815; died 1881. He was educated at Rugby and Balliol College, Oxford; took a first class in classics, and gained the Newdigate prize; obtained a fellowship, and remained a tutor for twelve years; was appointed in 1845 preacher to Oxford University; presented to the canonry of Canterbury in 1851; travelled extensively in Palestine, and accompanied in 1862 the Prince of Wales to the East; while in the following year he was, not without opposition, appointed dean of Westminster. In 1863 he married Lady Augusta Bruce, daughter of the seventh earl of Elgin (died 1876), to whom he owed much of his social popularity. He was a leader of the Broad Church party, and the author of numerous works, of which may be mentioned: *Life of Arnold* (1844), *Memoir of Bishop Stanley* (1850), *Commentary on the Epistles to the Corinthians* (1854), *Memorials of Canterbury Cathedral* (1855), *Sinai and Palestine* (1856), *Lectures on the Eastern Church* (1861), *Lectures on the Jewish Church* (1862-76), *Memorials of Westminster Abbey* (1867), *Essays on Church and State* (1870), *The Athanasian Creed* (1871), and *Lectures on the History of the Church of Scotland* (1872).

Stanley, SIR HENRY MORTON, born near Denbigh, in 1840, was placed in the poor-house of St. Asaph at the age of three; subsequently in 1855 shipped as cabin-boy to New Orleans, and was there adopted by a merchant, whose name he assumed, discarding his own name of John Rowlands. His adoptive father having died intestate, Stanley enlisted in the Confederate army, where he was taken prisoner, but after his discharge he volunteered into the U.S. navy, and became an ensign on the iron-clad *Ticonderoga*. At the close of the war he went to Turkey as a newspaper correspondent, and as war correspondent for the New York Herald he joined the Abyssinian expedition of 1867-68. He afterwards travelled in Spain, and it was while there in 1869 that he was asked by the proprietor of the New York Herald 'to go and find Livingstone.'

After visiting the Crimea, Palestine, Persia, and India, he reached Zanzibar in the early part of 1871, and from thence he proceeded across Africa in search of Livingstone. He met and relieved the traveller at Lake Tanganyika in November of the same year, and returned to England. He then acted as the Herald's correspondent during the Ashantee war (1873-74). As correspondent of the Daily Telegraph and the New York Herald



Sir Henry Morton Stanley.

he in 1874 undertook an expedition into Africa, where he explored the equatorial lake region and for the first time traced the Congo river from the interior to its mouth (1877). For the purpose of developing this vast region he returned in 1879 under the auspices of the International African Association, founded by the King of the Belgians, and after planting stations and establishing steam navigation this territory secured by Stanley was named in 1885 the Congo Free State. In 1887 he organized an expedition for the relief of Emin Pasha, who after the Mahdist rising in the Soudan was cooped up with his Egyptian followers in the Equatorial Province of Egypt at Wadelai, north of Lake Albert Nyanza. This time he entered Africa on the west by way of the Congo; and after a series of extraordinary marches through a forest region, accompanied with great hardships, he met Emin Pasha in the neighbourhood of the Albert Nyanza. After a return journey to bring up the rear-column, which he had left in charge of Major Barttelot on the Aruwimi, Stanley finally, in May 1889, set out from the Albert Nyanza, and brought the pasha and his followers to Bagamoyo in January 1890. On his return to Britain he undertook a lecturing tour, and was over-

whelmed with honours. He is the author of *How I Found Livingstone* (1872), *Through the Dark Continent* (1878), *The Congo*, and *the Founding of its Free State* (1885), and *In Darkest Africa* (1890). He was made G.C.B. in 1899, was M.P. for N. Lambeth 1895–1900, and died in 1904.

Stanley Falls. See *Congo Free State*.

Stannaries, COURT OF, a court of special and limited jurisdiction for the tin mines of Devonshire and Cornwall. By an Act of 1896 the stannary jurisdiction was transferred to the county courts, with right of appeal to the Court of Appeal. The courts have jurisdiction in respect of both common law and equity. The common law jurisdiction is wider in Cornwall than in Devonshire.

Stan'ovoi, or YABLONOI, a mountain-chain in the north-east of Asia, which forms the boundary between Siberia and Manchouria, skirts the sea of Okhotsk, and is continued, though with gradually diminishing height, to the shores of Behring's Strait. The whole length of the chain has been estimated at 3000 miles. The western part is often distinctively called Yablonoi. This mountain range gives rise to the rivers Amoor and Anadir on its south and east side, and to the Yenisei, Lena, Indighirka, and Kolyma on the north and west side.

Stanton, EDWIN M'MASTERS, an American statesman, was born at Steubenville, Ohio, 1814; died at Washington 1869. He acted for three years as clerk in a book shop; attended Kenyon College in 1831–33; subsequently studied law, and was called to the bar in 1836. He acquired a large practice in the supreme court at Washington, and when Buchanan was elected president (1857) he entered the cabinet. Shortly after the outbreak of hostilities between the North and the South, President Lincoln appointed him head of the war department (Jan. 1862), and his acceptance of the office marked the beginning of a vigorous military policy. He selected General Grant for promotion after the victory at Fort Donelson; and it was he who, in 1863, placed Grant in supreme command of the three armies operating in the south-west. In all the important movements of the war Stanton was consulted by the president. After the assassination of Lincoln he had some controversy with his successor, Andrew Johnson, who demanded his resignation. This he refused, and was upheld by the senate. In 1869 he was appointed justice of the supreme court, but he died a few days afterwards.

Stanza, in poetry, a number of lines or verses connected with each other, and properly ending in a full point or pause. A stanza presents in metre, rhymes, and the number of its lines a combination which repeats itself several times in the course of the same poem.

Stape'lia, an extensive and curious genus of plants, nat. order Asclepiadaceæ, or milk-weeds. Most of the species are natives of the Cape of Good Hope. They are succulent plants, without leaves, frequently



Stapelia variegata.

covered over with dark tubercles, giving them a very grotesque appearance. In most instances the flowers give off a very unpleasant odour, like that of rotten flesh, inasmuch that the name of carrion-flower has been given to some of these plants. They are, nevertheless, cultivated on account of their singular and beautiful flowers.

Staphyle'a. See *Bladder-nut*.

Staphyli'nus, a genus of coleopterous insects, with short wing-sheaths, the type of the family Staphylinidæ; commonly called *rove-beetles*.

Staphylo'ma, a name given to different tumours of the anterior surface of the globe of the eye. Called also *staphylosis*.

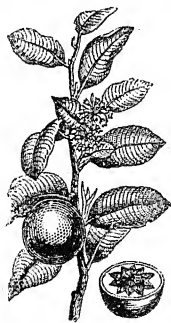
Staple, according to old usage, a settled mart or market-town where certain commodities were chiefly taken for sale. In England, formerly, the king's staple was established in certain ports or towns, and certain goods, such as wools, skins, and leather, could not be exported without being first brought to these ports to be rated and charged with the duty payable to the king or public treasury.

Star, POLAR. See *Pole-star*. There is a Swedish order of knighthood so named. It is bestowed specially on those who have distinguished themselves in a civil capacity. Its motto is, 'Nescit occasum.'

Staraiia-Russia, a town of Russia, in the government and 40 miles south of Novgorod, on the Polista. It has an imperial palace, a military colony, and important salt-works. Pop. 15,000.

Star-anise. See Anise.

Star-apple, the popular name of several species of plants of the genus *Chrysophyllum*, nat. order Sapotaceæ, whose fruit is esculent. *Chrysophyllum Cainito* is the most important species. It is a native of the West Indies. The fruit resembles a large apple, which in the inside is divided into ten cells, each containing a black seed, surrounded by a gelatinous pulp, which is very palatable.



Star-apple (*Chrysophyllum Cainito*).

Starboard, the right side of a ship when the eye is directed towards the head, stem, or prow. See Port.

Starch ($C_6H_{10}O_5$)_n, one of the most important chemical products of the vegetable kingdom, found in practically all plant tissues, more especially in seeds and tubers. As examples of seeds we have wheat, rice, and other cereals; of tubers, the potato; of the stem, the sago plant. The starch of commerce is chiefly extracted from wheat flour and potatoes. When pure, it is a snow-white powder of a glistening appearance. It is composed of transparent rounded grains, the size of which varies in different plants, those of the potato being among the largest, and those of wheat and rice the smallest. Each granule consists of a series of stratified concentric layers around a hilum, which usually occupies an eccentric position. It is insoluble in cold water, alcohol, and ether; but when heated with water the grains become ruptured, part—the granulose—dissolves, whilst the skin or coat—cellulose—remains undissolved. As the mass cools, it forms a stiff semi-opaque jelly. If dried up this yields a translucent mass, which softens and swells into a jelly with water. It is employed for stiffening linen and other cloth. When heated at a moderate temperature in an oven it is converted into a species of gum employed by calico-printers; potato starch answers best for this purpose.

(See *Dextrine*.) Starch is converted into glucose when boiled with dilute sulphuric acid; it forms the greatest portion of all farinaceous substances, particularly wheat flour, and it is the chief ingredient of bread. Starch gives a characteristic deep-blue colour with a drop of iodine solution.

Star-chamber, formerly an English court of civil and criminal jurisdiction at Westminster. It consisted originally of a committee of the privy-council, and was remodelled during the reign of Henry VII., when it consisted of four high officers of state, with power to add to their number a bishop and a temporal lord of the council, and two justices of the courts of Westminster. It had jurisdiction of forgery, perjury, riots, maintenance, fraud, libel, and conspiracy, and could inflict any punishment short of death. Its process was summary and often iniquitous (especially in the reigns of James I. and Charles I.), and the punishment it inflicted often arbitrary and cruel. This court was abolished (1640) by statute 16 Charles I.

Starch-hyacinth, a plant, the *Muscari racemösum*, of the same nat. order with the hyacinth, and named from the smell of the flower. Called also *Musk-hyacinth* and *Grape-hyacinth*.

Star-fishes, a term in its widest application embracing all the echinoderms comprised in the orders Ophiuroidea and Asteroidea, but more commonly restricted to the members of the latter order, of which the common genus *Asterias* may be taken as the type. The star-fishes proper are covered with a tough leathery skin beset with prickles, and have the form of a star, with five or more rays radiating from a central disc. In the middle of the under surface of the disc is situated the mouth, opening into a digestive system which sends prolongations into each ray. If the prickly skin be removed it will be seen to be supported by a series of plates beautifully jointed together. On the under surface of each ray the plates exhibit a series of perforations, through which, in the living state, the ambulacra or tubular feet can be protruded so as to effect locomotion. Star-fishes are found in almost all tropical and European seas, and some species are found as far north as Greenland.

Stargard, a town in the prov. of Pomerania, Prussia, situated on the navigable Ihna, 21 miles E.S.E. of Stettin. It has manu-

factures of leather, machinery, hats, soap, spirits, &c. Pop. 26,098.—There is another Stargard in West Prussia, 28 miles south by east of Danzig. Pop. 6634.

Star-gazer, a species of acanthopterygious fishes of the perch family, the *Urano-scopus scaber*, inhabiting the Mediterranean, and so called because the eyes are situated on the top of the head and directed towards the heavens. The name is also applied to fishes allied to the carp, of which *Anableps tetraphthalmus* is the best-known type. It is found in the rivers of Guiana, and acquires its name of 'four eyes' from its prominent and apparently divided eyes. See *Anableps*.

Starling, called also STARE, a bird belonging to the conirostral section of the order Passeres, genus *Sturnus* and family Sturnidae, a family of birds widely distributed throughout the world, and allied to the crows. The common starling (*Sturnus vulgaris*) is found in almost all parts of Europe. It is between 8 and 9 inches in length; the colour is blackish, with blue, purplish, or cupreous reflections, and each feather is marked at the extremity with a whitish triangular speck, giving the bird a speckled appearance. Starlings live mostly upon insects, build in old walls and hollow trees, and the eggs, usually five, are of a pale bluish tint. These birds are often kept in cages, and may be taught to whistle some tunes, and even to pronounce words and sentences. Allied species are the *Sturnus unicolor* found in Sardinia, the rose-coloured pastor of Asia and Africa, and the red-winged starling (*Agelæus phæniceus*) which occurs in America.

Star-nosed Mole, a North American genus (*Condylura*) of moles, distinguished by bearing at the extremity of their muzzle a remarkable structure of fleshy and somewhat cartilaginous rays disposed in the form of a star.

Starodoub, a town of Russia, in the government of Tchernigov, 97 miles north-east of Tchernigov. It has manufactures of leather and copper-ware and trade in hemp, tallow, corn, brandy, honey, and wax. Pop. 26,000.

Star of Bethlehem (*Ornithogalum umbellatum*; natural order Liliaceae), a bulbous-rooted plant with white star-like flowers. It is common in many parts of Europe, and is much cultivated in gardens for ornament.

Star of India. See *India, Orders of Knighthood in*.

Starosts, in Poland, those noblemen who were reckoned among the dignitaries of the land, and who received a castle or landed estate from the crown domains. Some of the starosts had civil and criminal jurisdiction over a certain district (*grod*), others merely enjoyed the revenues of the starosty.

Star-reed, a Peruvian plant of the genus *Aristolochia*, the *A. fragrantissima*, the root of which is highly esteemed in Peru as a remedy against dysenteries, malignant inflammatory fevers, colds, rheumatic pains, &c.

Stars, those self-shining bodies seen in the heavens at night, constituted like the sun, situated at immense distances from us, and doubtless, like our sun, the centres of systems similar to our own. To superficial observation stars are distinguished from planets by remaining apparently immovable with respect to one another, and hence they were called *fixed stars*, although their fixity has been disproved in numerous cases, and is no longer believed in regard to any. In order to distinguish the stars one from another the ancients divided the heavens into different spaces containing groups of stars called constellations. (See *Constellation*.) The stars are divided, according to their brightness, into stars of the first, second, third, &c., magnitudes; but no magnitude, in the proper sense of the word, has yet been observed in any star. All the stars beyond the sixth or seventh magnitude are called *telescopic stars*, as they cannot be seen without the aid of the telescope; and these are continued by astronomers down to the sixteenth magnitude. As to the absolute size of the stars little is known; but the light given out by Sirius is estimated at 63½ times that of the sun. The colours of the stars vary considerably, red, yellow, green, and blue being noticed. The stars are very irregularly distributed over the celestial sphere. In some regions scarcely a star is to be seen, while in others they seem crowded together, especially in the Milky Way. In some cases a certain number of stars evidently belong to a system by themselves. Of the stars visible to the naked eye at any one time the number probably does not exceed a few thousands, but in the telescope their number is so great as to defy all calculation. The distances of the stars from the earth are very great. The shortest distance yet found, that of α Centauri, a double star in the southern hemisphere, has been calculated at 20 billions of miles,

so that light takes $3\frac{1}{2}$ years to travel from it to our earth. Many stars have been observed whose light appears to undergo a regular periodic increase and diminution of brightness, amounting, in some instances, to a complete extinction and revival. These are called *variable* and *periodic stars*. It is found that some stars, formerly distinguished by their splendour have entirely disappeared. Such stars are called *temporary stars*. Many of the stars that usually appear single are found, when observed with telescopes of high magnifying power, to be really composed of two, and some of them three or more stars in close juxtaposition. These are termed *double* and *multiple stars*. By means of spectrum analysis some valuable results regarding the stars have latterly been obtained; in particular, many of the elements familiar to us have been detected in them, and the spectroscope has also proved that the star Arcturus is approaching us and Sirius receding. See *Astronomy*, *Nebula*, and *Meteor*.

Star-shoot, **STAR-SHOT**, a gelatinous substance often found in wet meadows, and formerly supposed to be the extinguished residuum of a shooting-star. It is, however, of vegetable origin, being the common nostoc. See *Nostoc*.

Star-stone, a rare variety of sapphire. When cut, and viewed in a direction perpendicular to the axis, it presents a peculiar reflection of light in the form of a star.

Star-thistle, a British plant (*Centaurea Oleitrapa*) which grows in gravelly, sandy, and waste places in the middle and south of England, especially near the sea, and is remarkable for its long spreading spiny bracts. The *yellow star-thistle* (*Centaurea solstitialis*) is occasionally seen in fields and waste places, principally in the east and south of England, and near Dublin. It is also called *St. Barnaby's thistle*. The *Jersey star-thistle* (*Centaurea Isnardii*) grows in pastures in Jersey and Guernsey.

Start Point, a headland near the southern extremity of Devonshire, about 9 miles S.S.W. of Dartmouth, at the entrance to the Start Bay, and having a lighthouse with a revolving light 204 feet above sea-level.

Starvation, or **INANITION**, is the physical effect produced by the total want of food and water. The symptoms of starvation in man are: an increasing loss of weight, severe pain in the stomach, loss of strength, sleeplessness, great thirst, in some cases stupor, and in other cases nervous excitement with con-

vulsions. Meanwhile the face assumes a haggard expression, the skin is said to become covered with a brown secretion, and at last death occurs in about eight days. With a good supply of water, however, life may be prolonged, in the absence of solid food, for a period of two or three weeks, and a moist atmosphere would even seem to favour the prolongation of life. Certain diseases, such as stricture or cancer of the opening to the stomach, &c., may occasion starvation, and it is to be noted that gradual starvation may result from the continued low percentage of nutritive matter in the daily diet. See *Fasting*.

Starwort, the popular name of several plants, some of them belonging to the genus *Stellaria*, or that of chickweed. *Sea starwort* is a British herbaceous plant of the genus *Aster*, the *A. Tripolium*. It has pale blue flowers with a yellow disc, and grows in salt marshes.

Stassfurt, a town of Prussia, province of Saxony, district of Magdeburg, on the Bode, famous for its great deposits of rock-salt and potassium salts (carnallite, kainite, kieserite), &c., the working of which is the most important industry, the products including potash, epsom-salts, glauber-salts, sulphate of potash, chloride of magnesium, bromine, &c. Pop. 18,300.

Staten Island, an island of the U. States, constituting the borough of Richmond in the (enlarged) city of New York, and separated from Long Island by the Narrows which form the entrance to New York harbour, and from New Jersey by Staten Island Sound, about $\frac{1}{2}$ mile broad. Its length is 14 miles, and its greatest breadth 8 miles. It contains numerous villages, abounds in pleasant scenery, and has constant communication with New York by steam ferry-boats.

Staten Island, an island off the south-east coast of Tierra-del-Fuego, separated from the mainland by the Strait of Le Maire. Its surface is mountainous. The chief harbour is Port-Cook on the north-east coast.

States, or **ESTATES**, in politics, sections of a community having common political privileges. See *Estates of the Realm*.

States-general (French *États Généraux*), thus called to distinguish them from the provincial states (*états provinciaux*), the name given in France till 1789 to the assemblies of the deputies of the three orders of the nation, the clergy, the nobility, and the third estate (*tiers état*). This assembly had little legislative power, its chief func-

STATES OF THE CHURCH — STATIUS.

tion being to register the king's decrees in matters of taxation. States-general were first convoked in 1302 by Philip the Fair; they were convened in 1614 by Louis XIII.; and again, for the last time, they met before the Revolution at the summons of Louis XVI. In the latter instance the third estate assumed the title of National Assembly, and the states-general ceased to exist. The name is at the present day applied to the legislative assembly of the Netherlands.

States of the Church. See *Papal States*.

Statice (stat'i-sē), a genus of herbaceous or sub-shrubby plants, nat. order Plumbaginaceæ. A number are cultivated in Britain, among them being *S. latifolia*, a Siberian species with blue flowers. The principal British species is *S. Limonium*, usually known as the sea-lavender. It is fairly common on the coasts of the United Kingdom.

Statics, that branch of dynamics which treats of the properties and relations of forces in equilibrium—equilibrium meaning that the forces are in perfect balance, so that the body upon which they act is in a state of rest. According to the classification still employed by many writers on the subject the word *statics* is used in opposition to *dynamics*, the former being the science of equilibrium or rest, and the latter of motion, both together constituting *mechanics*. But among more recent authors *mechanics* is used to express not the theory of force and motion, but rather its application to the arts. The word *dynamics* is employed as expressing the science which treats of the laws of force or power, thus corresponding closely to the old use of the term *mechanics*; and this science is divided into *statics* and *kinetics*, the first being the science which treats of forces considered as producing rest, and the second as treating of forces considered as producing motion. See *Dynamics*.

Stationery Office, a government office in London which supplies writing materials to the government offices at home and abroad, and arranges for the printing of reports and other matters laid before the House of Commons. There are a great number of valuable reports and other publications put out under the superintendence of this office, including ancient English chronicles, accounts of state trials, scientific and other results of the *Challenger* exploring voyage, the weekly Board of Trade Journal, &c.

Stations, a name variously used in the

Roman Catholic Church, but especially applied to the places at which ecclesiastical processions pause for the performance of an act of devotion, and to those representations of the successive stages of our Lord's passion which are often placed round the naves of large churches, and by the side of the way leading to sacred edifices, and which are visited in rotation.

Statistics, a collection of facts relating to a part or the whole of a country or people, or of facts relating to classes of individuals or interests in different countries; especially, those facts which illustrate the physical, social, moral, intellectual, political, industrial, and economical condition or changes of condition, and which admit of numerical statement and of arrangement in tables. The collection of statistics may have the object merely of ascertaining numbers, as is often the case with statistics collected for purely administrative purposes; or it may be undertaken with the view of learning what happens on an average of a great number of cases, as is the case of insurance statistics; or its object may be to detect the causes of phenomena that appear in the consideration of a great number of individual cases—such phenomena, for example, as the decline of a certain trade, the prevalence of a certain disease, &c. In all civilized countries the collection of statistics forms an important part of the administrative duties of government, and in some cases it is intrusted to a special bureau. The first country to possess an institution of this nature was Belgium, its organizer being the eminent statistician Lambert Quetelet. In Great Britain there is as yet no such government department; but the Board of Trade is intrusted with the collection and publication of a variety of statistical information relating chiefly to Great Britain and her colonies. The collection of statistics has also been greatly assisted by the formation of a statistical section in the British Association (1833), and the founding of the Royal Statistical Society in 1834 (incorporated 1887). The first congress of statisticians was held at Brussels in 1853, and an International Statistical Institute was founded in 1885. It is a recognized branch of economic and political science, and professorships have been founded to teach it.

Statius, PUBLIUS PAPINIUS, a Roman epic poet, born at Naples in the reign of the Emperor Nero, about 61 A.D., and died about 100 A.D. His principal productions

are two epic poems—the Thebais, in twelve books, on the war of the seven Greek princes against Thebes; and the Achilleis, in two books, on the achievements of Achilles.

Statue. See *Sculpture*.

Statute, a law proceeding from the government of a state; a written law; in Britain, an act of parliament made by the sovereign by and with the advice of the Lords and Commons. Some ancient statutes are in the form of charters or ordinances, proceeding from the crown, the consent of the Lords and Commons not being expressed. Statutes are either public or private (in the latter case affecting an individual or a company); but the term is usually restricted to public acts of a general and permanent character. Statutes are said to be *declaratory* of the law as it stood before their passing; *remedial*, to correct defects in the common law; and *penal*, imposing prohibitions and penalties. The term *statute* is commonly applied to the acts of a legislative body consisting of representatives. In monarchies not having representative bodies, the laws of the sovereign are called *edicts*, *decrees*, *ordinances*, *rescripts*, &c.

Statute of Limitations. See *Limitations*.

Staubbach (stoub'bák), FALL OF, a waterfall, whose height is about 900 feet, situated in Switzerland, canton of Berne, nearly 6 miles south-east of Interlaken, and about a mile from the village of Lauterbrunnen. The stream is so small that the water is converted into spray long before it reaches the bottom.

Staunton, a town, United States, capital of Augusta county, Virginia, in a fertile district on Lewis Creek, 136 miles w.n.w. of Richmond. It has state institutions for the deaf, dumb, and blind, iron-foundries and other industries. Pop. 7289.

Staunton, HOWARD, born in 1810, died 1874. He was educated at Oxford, and settled in London as editor of the Chess Player's Chronicle. In this game he defeated M. St. Amant (1843), the champion of Europe, and he subsequently published various treatises on chess, as the Handbook (1847), the Companion (1849), Chess Tournament (1852), and Chess Praxis (1860). He was an eminent Shaksperian scholar, and published an edition of the Plays and Poems (three vols. 1857-60), a facsimile of the (1623) first folio, and Memorials of Shakspeare (1864). He was also the author of the Great Schools of England (1865).

Stavanger (stá-vàng'èr), a seaport of Norway, on an arm of the Bukkefiord, 105 miles north-west of Christiansand. It is one of the oldest towns in Norway, and has a remarkable ancient Gothic cathedral, one of the finest Gothic monuments in the country. It has some manufactures, a good harbour, and an active trade in connection with fishing. Pop. 34,800.

Stav'oren, a village of Holland, in the province of Friesland, 29 miles south-west from Leeuwarden, at the entrance to the Zuyder-Zee. It was once an important seaport, but it has now become an insignificant place, the harbour having been sanded up. Pop. 900.

Stavro'pol, a government of Russia in the Caucasus, and bordering on the Caspian Sea; area, 28,200 sq. miles. This territory, which is low, flat, and infertile, is watered by the Kuban, Terek, and Kuma, and is subject to sudden inundations. The inhabitants are chiefly Russians, Cossacks, and nomad Turkomans. Pop. 876,298. — **STAVROPOL**, the capital of this district, is strongly fortified, and has a large trade in horses, cattle, sheep, &c. Pop. 41,621.

Stawell, a town of Australia in Victoria, 176 miles north-west of Melbourne. The public buildings include a town-hall, courthouse, post and telegraph office, hospital, handsome churches, mechanics' institute, and theatre. It is the centre of the Pleasant Creek gold-field, and is best known on account of its rich quartz reefs. Pop. 5296.

Stay, in ships, a large, strong rope, extending from the upper end of a mast down to another mast, or to some part of the vessel, with the object of lending support to the mast to whose top it is attached. Those leading forward are called fore-and-aft stays, and those leading down to the vessel's sides and pulling a little backwards are called back stays. A sail extended on a stay is a stay sail. In large vessels there are a number of these of a triangular shape. *To stay* is to tack or bring the ship's head up to the wind for going about; *to miss stays* is to fail in the attempt to go about. *In stays or hove in stays* is the situation of a vessel when she is in the act of going about.

Stays. See *Corset*.

Stealing. See *Larceny*.

Steam is the vaporous substance into which water is converted under certain conditions of heat and pressure. It may be said, indeed, that water gives off vapour or steam at every temperature, but the term is

technically applied to the elastic aeriform fluid generated by heating water to the boiling point. Steam, in its perfect state, is transparent, colourless, and invisible; but when it has been deprived of part of its heat by coming into contact with cold air, it suddenly assumes a cloudy appearance, and is condensed into water. When water, in an open vessel, is heated to the boiling point (212° F.) globules of steam are formed at the bottom and rise to the surface, where they pass off in vapour. In this case all the heat which enters into the water is solely employed in converting it into steam of the temperature of boiling water, while the continued and increased application of heat will only cause a more rapid formation of steam until the whole of the water evaporates. When water, however, is confined in a strong close vessel, both it and the steam which it produces may be brought to any temperature; and as steam at boiling point occupies 1642 times the space of the water from which it is generated, it follows that when thus confined it must exercise an enormous expansive force. Steam, as used in the steam-engine, holds water in suspension mechanically, and is called *saturated steam*; while the steam which receives additional heat apart from water is called *superheated steam*, and approximates to the condition of a perfect gas. When the temperature of saturated steam is considerably above 212° F., the steam formed under such conditions is termed *high-pressure steam*, while at 212° F. it is called *low-pressure steam*, and its pressure is equal to that of one atmosphere, or 14·7 lbs. on the square inch. Another element in the constitution of steam is its density which is expressed by the weight of 1 cubic foot of the steam. This density is increased with an increase of the pressure under which the steam is generated, for the particles of steam become more closely packed together. Thus the density of steam produced at 212° has been found to be equal to '038 lb. or $\frac{1}{26}$ oz. per cubic foot, from which it follows that the volume of 1 lb. of such steam is equal to 26·36 cubic feet. Like the pressure or expansive force of steam, the density is invariably the same for a given temperature. From the possession of the properties thus briefly stated, steam constitutes an invaluable agent for the production of mechanical force, as shown in the various uses of the steam-engine. It is also employed in distributing the heat used for warming build-

ings, in heating baths, evaporating solutions, brewing, drying, dyeing, and even for cookery.

Steam-engine, a mechanical contrivance, in which the force arising from the elasticity and expansive action of steam, or from its property of rapid condensation, or from the combination of these qualities, is made available as a source of motive power in the arts and manufactures, and in locomotion. The expansive power of steam was known to the ancients, and its earliest use in connection with a mechanical contrivance is noted by Hero of Alexandria (about 130 B.C.) in his *Pneumatica*. In this treatise Hero describes an æolipile or hollow spherical vessel turning on an axis, supplied with steam, and driven by the reaction from the escaping jets of steam, much in the same way as Barker's mill (which see) is driven by escaping water. This invention had no practical result, and it was not until the 17th century that the power of steam was again recognized by Giovanni Battista della Porta (1601), Solomon de Caus (1615), Giovanni Branca (1629), and the Marquis of Worcester (1663). Their various inventions were an adaptation of the principle that a mechanical power is obtained by the pressure of steam acting on the surface of water placed in a closed vessel. This principle was put to practical use by Captain Thomas Savery (1698) in a steam-engine which he constructed for the purpose of raising water out of mines; and with the elevation of water by pressure he also combined the principle of obtaining a vacuum by condensation. This principle, however, was made more practically effective by Denis Papin (1690), who constructed a steam-engine in which a piston was forced down through the vacuum made by condensation. This first conception of a piston working in a cylinder was further developed by Newcomen (1705) and his assistant Cawley. In their engine the boiler and furnace were separated from the cylinder and piston, and its chief characteristic was an oscillating *beam* connected on one side with the piston and on the other side with a pump-rod in the mine. When a vacuum was made under the piston in the cylinder by the injection of a jet of water, causing condensation, the piston was driven down by the pressure of the atmosphere, and as that end of the beam was lowered, the other end attached to the pump-rod was raised with its load of water. Various improvements were made upon this atmospheric

steam-engine by Smeaton and others, but its greatest development was effected by James Watt (1769). His improvements consisted in condensing the steam, not in the cylinder, but in a separate condenser, thus preventing the waste occasioned previously by the chilling and heating of the cylinder. Besides this, he preserved the heat in the cylinder by surrounding it with a layer of hot steam inside of an external casing; and with the same object he employed steam, instead of air, to press down the piston from above. Thus he obtained the *double-acting* engine, which is so named because both the up-stroke and the down-stroke are produced by means of steam. Further, he devised a crank motion which converted the alternating motion of the oscillating beam into a continuous rotatory motion; but as this invention was pirated he patented the 'sun-and-planet' wheel as a substitute for the crank, returning afterwards to the crank. To these improvements he subsequently added a fly-wheel, in order to equalize the motion so as to drive the crank past the dead-points; a governor, whose purpose was to regulate the quantity of steam passing into the cylinder; an indicator, to measure the pressure upon the piston; and a slide-valve, moved automatically by an eccentric, the object of which was to regulate the action of the steam in the cylinder. The steam-engine, as thus developed by Watt, was in nearly all essential points the same as the present-day engine. Probably the only improvement of primary importance which has been made in the steam-engine since the time of Watt, is the manner in which steam is now used expansively. It was Jonathan Hornblower (1781) who first adopted the principle of expanding steam in two cylinders of different sizes. This form of *compound engine*, as it was called, was employed by Woolf (1814) in the Cornish mines, while it was improved by M'Naught (1845), and adapted by Elder (1854) to the use of marine engines. In the compound engine the steam receives the greater part of its expansion in a second cylinder of much larger diameter than the first, and by this means greater steadiness of piston-stroke, economy of fuel, and increased driving power have been obtained. The use of expanded steam has been especially notable in the marine engine, where it is now expanded successively in three or even four cylinders (see below).

The accompanying illustration represents

a sectional elevation of a *beam condensing steam-engine*, and shows the principles embodied in Watt's steam-engine. The pipe conveying the steam from the boiler opens into the part marked *l*, which incloses a movable valve by means of which the steam may be alternately admitted into the cylinder *a* by the upper port *c* and lower *d*; between these points the piston *b* works steam-tight. The valve *l* is so contrived that while it allows steam to pass into the cylinder through one of the ports, it shall at the same time open a communication between the opposite side of the piston and the condenser *n*, which is a hollow vessel kept constantly immersed in cold water, a portion of which is admitted into it by the injection-cock *o*; consequently, the steam thus admitted is instantly deprived of its heat, and reconverted into its original form of water, thereby forming a vacuum. Thus it will be seen that, on the communication being opened up between the boiler and either side of the piston, the latter will ascend or descend in the cylinder unimpeded by the resistance of the atmosphere against the other side, and with a force proportional to the pressure of the steam; and as the motions of the steam-valve *l* are regulated by the engine itself, the above action is kept up continuously. The alternating rectilinear motion thus generated within the cylinder is transmitted, by means of a rod attached to the piston, to a strong beam *f f*, movable upon a central axis, a system of jointed rods *e e*, called the *parallel motion*, being interposed for the purpose of neutralizing the disturbing action which the circular path of the beam would otherwise exert upon the piston. The reciprocating motion of the beam is now, through the intervention of the connecting-rod *g* and crank *h*, converted into a circular or rotatory motion, which is rendered continuous and uniform by the fly-wheel *i*, to the axis of which the machinery to be impelled is connected. The air-pump *p* for withdrawing the vapour and water from the condenser, the feed-pump *s* for supplying the boilers, and cold-water pump *t* for supplying the condenser cistern, are all worked by rods from the beam; and the governor *u*, for maintaining uniformity of motion, is driven by a band from the crank-shaft. The above description refers more immediately to that class of steam-engines called *low-pressure* engines.

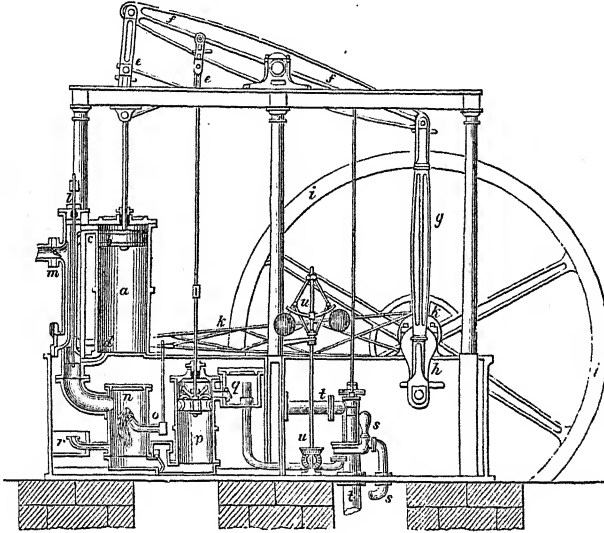
The various forms of the steam-engine have received a varied form of classification.

STEAM-ENGINE.

There are the general divisions into *condensing* and *non-condensing* engines, *compound* and *non-compound*, and *single*, *double*, or *direct acting*. Again there is the classification connected with the position of the cylinder, as in the *horizontal*, *vertical*, and *inclined* cylinder engines. Another classification, and that which is adopted here, is

to divide steam-engines into the uses to which they are applied.

(1) *Stationary Engines* comprise all such engines as are permanently fixed for the purpose of driving the machinery in a factory, pumping water, &c. For a long time the favourite engine for these purposes was of the beam condensing type adopted and



Beam Condensing Steam-engine.

a, The steam-cylinder; b, the piston; c, the upper steam-port or passage; d, the lower steam-port; e, e, the parallel motion; f, the beam; g, the connecting-rod; h, the crank; i, the fly-wheel; k, k, the eccentric and its rod for working the steam-valve; l, the steam-valve and valve-casing; m, the throttle-valve; n, the condenser; o, the injection-cock; p, the air-pump; q, the hot-well; r, the snifting-valve for creating a vacuum in the condenser previous to starting the engine; s, the feed-pump for supplying the boilers; t, the cold-water pump for supplying the condenser cistern; u, the governor.

improved by Watt. But this has now, for the most part, been superseded by an engine the cylinders and connections of which are horizontal. In the most modern type the cylinder is fixed endwise to a baseplate at one extremity, the crank-shaft has its bearings on the same base at the other extremity, and the piston-rod driven horizontally is guided by means of a crosshead, the ends of which slide between two parallel bars fixed on the frame. The Corliss engine is a well-known type of horizontal engine, its characteristic feature being the system of reciprocating valves by which the steam is passed to and from the cylinder. In some engines, especially such as are used as *winding* engines, a pair of coupled horizontal cylinders are

now used; and in the larger form of horizontal engine two cylinders of high and low pressure are placed either side by side or one before the other. In cases where the cylinders are vertical the other general arrangements are much the same as in the horizontal engine.

(2) In *Portable Engines* the boiler and engine go together, the boiler being undermost; and the whole is supported upon four wheels, by means of which it is moved from place to place. The chimney is turned down over the boiler when not in use. A 'semi-portable' engine is of the same type, but has no wheels, though it may easily be made portable temporarily or permanently.

(3) The *Road-locomotive* was first sug-

STEAM-ENGINE.

gested by William Symington in Scotland, and developed for practical purposes about 1800 by Oliver Evans in America and Treve-thick in Wales. It was used to propel carriages from town to town, but the badness of the turnpike roads and the subsequent introduction of railways brought the road-locomotive, as a means of transit, into disuse. In a modern form it is employed to draw heavy loads along the highway or over fields in farming operations. The chief characteristic of this *traction engine*, as it is called, is the great width of the wheels. Automobile steam-wagons, carrying a load and tralling another; steam ploughing engines, employed in pairs, one at either end of a field; and steam road-rollers are also used.

(4) The *Railway-locomotive* is a steam-engine and boiler placed upon wheels and employed to transport a train of wagons or carriages upon a railway. Various attempts had been made to construct a steam-engine to run upon rails by Blenkinsop (1811), Blackett (1812), Hedley (1813), Dodds & Stephenson (1815), and others. It was not, however, until the opening of the Liverpool and Manchester Railway in 1829 that the modern high-speed locomotive came into use. Upon that occasion a prize of £500 was offered for the best locomotive, and this was gained by an engine called the 'Rocket' built by George Stephenson. This locomotive, which ran on four wheels, weighed 4 tons 5 cwts., and the tender 3 tons 4 cwts.; the steam cylinders were 8 inches in diameter with $16\frac{1}{2}$ inches of stroke; the driving-wheels were 4 feet $8\frac{1}{2}$ inches in diameter; the total gross weight drawn was about 17 tons; and the speed attained was an average of 14 miles per hour, with an occasional speed of 29 miles per hour. In this engine there were brought together the three primary elements which, having been developed, make the efficiency of the modern locomotive—viz., the internal water-surrounded fire-box and the multi-tubular flue in the boiler; the blast-pipe, from which the waste steam of the engine was exhausted up the chimney; and the direct connection of the two steam cylinders, one on each side of the engine, with the driving-wheels, on one axle. From this early locomotive the two modern types, differentiated by the position of the cylinder, have been developed. In the *inside-cylinder* locomotive the cylinder is situated within the framing, under the boiler, with the main driving-axle cranked at two points to receive

the power from the two cylinders; while in the *outside-cylinder* locomotive the cylinder is external to the framing and connected, not to the axle, but to the crank-pins fixed between the spokes of the wheels in connection with the nave. Another point of advance on the early locomotive is in the number of the wheels. These now vary from six to twelve, and a greater tractive power is secured by coupling three or even four wheels together upon one side. A system has also been adopted of putting four wheels in front of a locomotive on a small truck or *bogie*, which turns upon a central pivot and adapts itself to the curves of the line, so that the tractional resistance is lessened. The principle of the expansion of steam in high-pressure and low-pressure cylinders has also been adopted, in order to save fuel, in some locomotives. The British express passenger engine of the modern type now forms a striking contrast to the engine of the 'Rocket'; it weighs, say, 50 or 60 tons in working order, and with the loaded tender, 80 tons or more; its cylinders are from 19 to 20 inches in diameter, with a stroke of about 26 inches; the driving-wheels are from 7 to 8 feet in diameter; and the speed attained, about 54 miles per hour. The modern goods engine generally has six wheels coupled, and is capable of drawing a train of wagons weighing 672 tons up an incline of 1 in 178, this being equivalent to a gross weight, including engine and tender, of 1816 tons on a level. The increase of power in British engines is hampered by the narrowness of the gauge, and limits as to height and breadth in loading. Comparatively few weigh over 60 tons, or have 2000 sq. feet of heating surface, or 200 lbs. steam pressure; while in America the engine may weigh over 80 tons, have 3000 sq. feet of heating surface, and 200 lbs. or more of pressure.

(5) The earliest form of *Marine Engine* seems to have been devised by Patrick Miller of Dalswinton, and constructed in Edinburgh (1788) by William Symington. Its cylinders were 4 inches in diameter, and it was able to drive a pleasure-boat 25 feet long, with two central paddle-wheels, at a speed of 5 miles an hour. Subsequently Symington constructed (1801) an engine on Watt's double-acting principle, and with a stern-wheel, which was used on a canal in Scotland, in a steamboat called the *Charlotte Dundas*. This engine was seen by Robert Fulton, who employed (1807) an

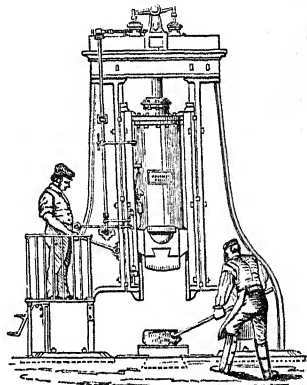
English firm to build a similar engine for a steamer called the *Clermont*, which he afterwards successfully employed upon the Hudson river in America. In Great Britain the first passenger steam-vessel was the *Comet*, built (1812) at Port-Glasgow by John Wood to the order of Henry Bell, who employed it to ply between Glasgow and Greenock. The *Comet*, which had side paddle-wheels and was about 42 feet long and 11 feet wide, was driven by a kind of inverted beam-engine, with a single vertical cylinder, developing four or five horse-power. These early marine engines were constructed in a manner similar to Watt's land engine, but the position of the beam so high above the deck was soon recognized as a defect, especially in sea-going steamers. Instead, therefore, of a beam placed above the cylinder and piston, two beams or levers were placed below, one on each side of the engine, and the connecting-rod conveyed the power to the crank upwards instead of downwards. This design, however, was soon discarded in favour of an arrangement by which the cylinder was placed beneath and connected directly with the crank. An *oscillating cylinder* was next introduced, which moved with the swing of the crank and enabled the piston-rods to be connected directly with it. The screw-propeller necessitated a totally different type of marine engine. The cylinder was now inverted and placed above the shaft of the screw near the deck, and the connection with the crank was formed by means of an ordinary connecting-rod. In ships-of-war a horizontal direct-acting engine was adopted in order to keep the machinery below the water-line and out of danger from the enemy's guns. This took various forms, such as Penn's trunk-engine, where compactness was obtained by securing the connecting-rod directly to the piston and using the piston-rod as a hollow trunk within which the connecting-rod could oscillate freely; and the engine designed by Maudslay, in which two piston-rods proceed from each piston, and the connecting-rod is reversed so as to embrace the crank on the screw-shaft, near which the cylinder is placed. Recently in war-ships the inverted vertical direct-acting engine as used in nearly all large ocean steamers has been adopted. There are usually three cylinders set in line above the shaft, working on cranks at 120° from one another. Triple or three-stage expansion has been generally adopted, and quadruple expansion engines have also

been constructed. In engines of large power a high-pressure cylinder and two low-pressure cylinders may be employed, or two low-pressure and two high-pressure, and there may be four cranks in all. Latterly, instead of reciprocating engines, steam turbines have been employed with success, and are now becoming common both for mercantile and war vessels. See *Turbine* in SUPP.

Steamer (or RACE-HORSE) Duck (*Micropterus brachypterus*), a species of marine duck from 35 to 40 inches in length, distinguished by its small, short wings, and the swiftness with which it paddles over the surface of the water. It is found in Patagonia and the Falkland Islands.

Steam-gauge. See *Gauge*.

Steam-hammer, a machine employed in making large iron and steel forgings, and consisting usually of a steam-cylinder and piston with a metal striker placed vertically



Condle's Steam-Hammer.

over an anvil. In the hammer invented by James Nasmyth about 1839, and patented in 1842, the first steam-hammer to come into practical use, the cylinder is fixed, and the hammer-head attached to the lower end of the piston-rod delivers its blows by the direct action of the steam in the cylinder. In operation the steam is introduced into the cylinder immediately below the piston, and it raises the hammer between the guides to the required height. The steam being then cut off, and the exhaust-valve opened, the hammer descends with a velocity augmented by the compression of the air above the piston. As an improvement steam pressure is now also applied above the piston

STEAM NAVIGATION.

to increase the downward stroke of the hammer. By means of the valves and valve gearing the person in charge of the machine has complete control over the slightest movement of the hammer. In Condie's steam-hammer the piston-rod is attached to the top of the hammer frame, and the cylinder is movable; the hammer-head is attached to and falls with the cylinder, which thereby adds an additional weight to the blow. In the duplex steam-hammer patented by Ramsbottom the anvil is discarded, and two hammer-heads of equal weight deliver their blows upon the forging horizontally. From the increased size of gun forgings the steam-hammer has now attained enormous proportions, one erected by Krupp at Essen in 1888 being 150 tons. There is a probability, however, that steam will be superseded by hydraulic or pneumatic power in the largest hammers.

Steam Navigation, the navigation of ships in which steam is the sole or main propelling power. As early as 1736 Jonathan Hulls in England patented a method of propelling a vessel by steam by means of a stern wheel. In America James Rumsey and also John Fitch succeeded in 1786 in constructing each a vessel that was actually driven by steam; but the real precursor of the paddle-wheel steamer was constructed in 1788 by a Scottish landed proprietor, Patrick Miller of Dalswinton, on Dalswinton Loch, Dumfriesshire. This vessel, which was a double or twin boat, measured 25 feet in length by 7 feet in breadth, and was fitted with two paddle-wheels, one before and the other behind the engine. The mechanical part was constructed in Edinburgh under the superintendence of William Symington, and the speed attained was about 5 miles an hour. The following year a larger boat was built on the same principle and successfully tried on the Forth and Clyde Canal. In 1801 Lord Dundas employed Symington to construct a steamboat for use upon the Forth and Clyde Canal. This vessel, which was launched in 1802 and named the *Charlotte Dundas*, had one paddle-wheel near the stern, and was driven by a direct-acting horizontal engine with a connecting-rod and crank. It was seen by Robert Fulton, an American engineer, who employed (1807) the English firm of Boulton and Watt to construct an engine upon the same principle, and this he fitted into a steamer called the *Clermont*, 130 feet long, which plied successfully upon the Hudson River. A number of steam-vessels were soon after plying on

American waters. The first passenger steamer employed in Great Britain was the *Comet*, a vessel designed and built (1812) to the order of Henry Bell by John Wood of Port-Glasgow, and fitted with an engine by John Robertson of Glasgow. This was a wooden vessel, 42 feet long, 11 feet broad, and 5 feet 6 inches deep, with a long funnel which served as a mast to which a large square sail was attached. The engine, in its first form, had a cylinder 11 inches in diameter with a stroke of 16 inches, a fly-wheel, and two pair of paddle-wheels, 7 feet in diameter, with a spur-wheel arrangement in order to make the paddles rotate at the same speed. The double paddle-wheel arrangement proved a failure, and another engine was substituted with a cylinder 12½ inches in diameter, 4 horse-power, and a single pair of paddle-wheels. After the *Comet* was successfully tried numerous steamboats were built: among others the *Rob Roy* (1818), which was the first to establish regular sailings between Greenock and Belfast; and the *Talbot* (1819), which plied between Holyhead and Dublin. The first steam-vessel employed in the British navy was built (1822) at Woolwich dockyard, and was called the *Comet*. It measured 115 feet in length, 21 feet in breadth, and its pair of engines, which were constructed by Boulton and Watt, developed 40 horse-power each. In 1819 the *Savannah* made the voyage to Liverpool from America in twenty-six days, its capacity as a sailing vessel being partly aided by steam. It was not until 1838, however, that regular steamboat communication was established across the Atlantic. In that year the *Sirius* steamed from London to New York in seventeen days; and a few months afterwards the *Great Western* made the voyage from Bristol to New York in fifteen days. These were all paddle-steamers, and that type of vessel culminated in the *Scotia* (1861) of the Cunard line, which made the passage to New York in nine days. The measurements of this vessel were: length 366 feet, breadth 47 feet 6 inches; cylinder diameter 100 inches with a stroke of 12 feet, and the engines were of the side-lever type. Meanwhile various experiments were made with the screw-propeller (which see). The first steamer in Great Britain fitted with a screw was the *Archimedes* (1839), built on the Thames; the first screw-ship in the British navy was the *Darwin* (1843); and the first iron screw-steamer was the *Fire Queen* (1845), built at Glasgow. The latest type

THE MANUFACTURE OF BESSEMER STEEL

The manufacture of Bessemer Steel is briefly described in the article STEEL, but the accompanying plate, along with the key and numbered references, will give the reader a far better idea of how this important process is carried on than could be given by any description. The plate shows a *heat* (8 tons) of melted iron being *blown*, or deprived of its carbon, in one converter, while a previous heat is in the ladle and is being run through a hole in the bottom into the moulds in which the steel ingots are cast. The moulds, at the proper time, are lifted by the crane seen on the left of the picture, leaving the white-hot ingots in the *pit*. These again are lifted out and carried to the rolling-mill close at hand, to be rolled into rails, &c. The man on the right is cooling moulds by turning a stream of cold water on them, hence the steam. The cupola furnaces for melting the pig-iron are at the back and above, the molten iron being run through the troughs or *runners* to the converters, which may be turned down to be charged. The plate can give little or no idea of the roar of the blast passing through the molten iron in the converter, the brilliancy of the flame, the steam, smoke, heat, dust, and din, all of which are painfully evident to a visitor.

of ocean steamer is represented by the *Lusitania* and *Mauritania*, launched for the Cunard line in 1906. Built of steel like all large modern steamships, they are 785 feet long and 88 feet broad. Their gross tonnage is 32,500, and they are equipped with turbine engines of 70,000 or 80,000 horse-power.

Steam-plough. See *Plough*.

Steam-whistle, an appliance connected with the boiler of a steam-engine for the purpose of making a loud whistling sound. In one form a tube opening into the boiler is commanded by a stop-cock; the tube ends in a portion perforated with holes and surrounded by a thin brass cup; and the tube and cup are so adjusted as to leave a narrow opening all round. Above this opening a thin brass cup is fixed in an inverted position so as to present a sharp edge to the orifice. When the stop-cock is opened the steam rushes out, and in coming in contact with the sharp edge of the cup it produces a loud shrill sound. Steam-whistles can be made to give off musical tones.

Steam-winch, a form of winch in which rotatory motion is imparted to the winding axle from the piston-rod of a steam-engine, either directly or indirectly.

Stearic Acid ($C_{18}H_{36}O_2$) is one of the most important and abundant of the fatty acids. Its compound with glycerine is known as stearin or tristearin, and occurs in beef and mutton suet, and in several vegetable fats. Stearic acid, which is inodorous, tasteless, insoluble in water but soluble in alcohol, forms white scaly crystals melting at 69° C. With alkalis and metallic oxides it forms salts known as stearates. It burns like wax, and is used in making candles. See next article.

Stearin, or **TRISTEARIN** ($C_{57}H_{110}O_6$), the chief ingredient of suet and tallow, or the harder ingredient of animal fats, palmitin and olein being the softer ones. It is obtained from mutton suet by repeated solution in ether and crystallization, or from tallow by pressing between hot plates and subsequent crystallization from ether; but in either case usually retains small amounts of palmitin. The commercial product becomes rancid on exposure to air. It has a pearly lustre, is soft to the touch, but not greasy. It is insoluble in water, but soluble in hot alcohol and ether. When treated with superheated steam it is hydrolysed to stearic acid and glycerine, and when boiled

with alkalis is saponified, forming a soap and glycerine.

Steatite, a variety of talc, hydrated magnesian silicate, usually devoid of distinct crystalline structure. It is a compact stone, white, green of all shades, gray, brown or marbled, is very soft, and is soapy or unctuous to the touch, hence the name *soapstone*. It is used in the manufacture of porcelain, in polishing marble, as a lubricant, and as the basis of rouge and other cosmetic powders. See *Talc*.

Steel is the term applied to certain qualities of iron containing carbon; but as the proportion of carbon can be graded continuously from wrought-iron, which contains less than 0.5 per cent of carbon, up to cast-iron, which may contain as much as 10 per cent, the position of steel lying between these is necessarily indefinite. (See *Iron*.) Besides the essential elements iron and carbon, steel may also contain small quantities of silicon, phosphorus, manganese, and sulphur. In steel used for tools, springs, and various other purposes, long practically the only kind in use, and now known as *hard* or *tool* steel, the carbon varies in amount from about 0.5 to 1.5 per cent; the toughness, tenacity, and hardness being increased with the increase of the carbon, while the elasticity decreases with the increase of hardness. *Mild* or structural steel contains from 0.1 to 0.5 per cent of carbon. In a red-hot condition steel can be welded almost as easily as bar-iron. It is a bright grayish-white in colour, the texture is granular, and in specific gravity it varies from 7.62 to 7.81. In commerce it takes various names: as when it is called *blister-steel* from its surface acquiring that character in the process of cementation, *shear-steel* when blister-steel is rolled or beaten into bars, and *cast-steel* when it is melted or cast into ingots. When it is produced from cast-iron in the refining-house it is called *furnace steel*. The value of hard or tool steel depends greatly on the readiness with which it can be *tempered*. It is found that the higher the temperature to which it is raised and the more sudden the cooling the greater is the hardness; hence any degree of hardness can be given to steel by applying the necessary variations of temperature. The colour of steel varies according to the degree of hardness to which it is tempered, and these colours at one time served to guide the workmen in tempering, but now

a thermometer, with a bath of mercury or oil, is used. The properties of steel are largely affected by the introduction of small quantities of other metals. Thus, the introduction of manganese (up to 8 per cent) or of chromium (1 per cent) produces a considerable hardening effect. The addition of nickel renders steel tougher and more serviceable for armour plates.

Some of the commonest and more valuable methods of producing steel are:—(1) *The direct reduction of iron ores.* In this process the iron ore is mixed with charcoal and heated until metallic iron is produced, after which more charcoal is added and the material further heated until steel is produced. The disadvantage of this process is that it yields an irregular mixture of steel and iron. (2) *The cementation process,* which consists in adding the requisite amount of carbon to wrought-iron. The bars of iron are placed in fire-brick chambers between layers of charcoal and there subjected to heat from a furnace underneath. The fire is usually maintained for six or eight days, and the temperature to which it is raised depends upon the degree of carbonization required. When the bars, now become steel by the addition of carbon, are withdrawn they are brittle and covered with blisters. (3) *The Bessemer process.* In this method, which was adopted by Mr. Bessemer in 1856, the carbon is first removed from the pig-iron by blowing a stream of compressed air through the metal when in a molten condition. When this is accomplished the exact amount of carbon required is afterwards added in the form of *spiegeleisen*, or some other variety of iron rich in carbon. Briefly, the process is conducted as follows:—The charge of molten pig-iron is run from the furnace into the *converter*. This latter is a vessel shaped like a bottle with the neck slightly bent sideways, formed of boiler plate, and lined internally with a compact kind of sandstone called 'ganister'. The converter is then swung back into a vertical position, and in doing this the air-blast is automatically turned on. In a few minutes most of the carbon is oxidized by the air to carbon dioxide and passes away with the blast, which is then shut off, a quantity of molten *spiegeleisen* is run in, and then the whole contents of the converter are poured out into the casting ladle. (4) *The 'basic' or Thomas-Gilchrist process* removes the phosphorus from such highly phosphoretic ores

as those found in the Cleveland district. To effect this the ordinary Bessemer converter is lined with a mixture of magnesia and lime, a quantity of the latter being also added to the charge when the blast is in progress. This lining supplies bases which combine with the phosphorus pentoxide produced by the oxidation of the phosphorus, thus forming metallic phosphates. The phosphates thus obtained are known as *basic slag*, and form a valuable manure. (5) *In the Siemens-Martin or open-hearth process,* pig-iron is decarbonized by mixing it with wrought-iron, iron rust, and ores containing oxides of iron. First the pig iron is run off into a furnace heated to a very high temperature by gas from a Siemens' regenerative gas furnace. Then wrought-iron and iron oxides are added in small quantities until the decarbonization of the pig-iron is complete. When this is accomplished a fresh quantity of pig-iron is added to supply the exact amount of carbon required. The whole mass is then heated for a short time until ready to be run off into ingot moulds. In the more modern 'Siemens' process a much larger relative quantity of pig-iron is employed, and this in the molten state is run into a small amount of molten iron contained on the bed and previously completely oxygenated. Iron containing phosphorus can also be used in a Siemens furnace, provided a basic bed is used, and 70 per cent of the American Siemens steel is manufactured in this way. As a result of the improved methods of manufacture the cost of steel has been greatly reduced, and it has displaced wrought-iron for many purposes, especially in the building of ships, while new uses for it have been found. Besides *manganese steel* and *nickel steel*, *harveyized steel* is a variety possessing special strength and hardness. See also *Case-hardening, Cementation, Manganese, &c.*

Steel-bow, a term in Scots law, *steel-bow goods* consisting in corn, cattle, straw, implements, &c., delivered by the landlord to his tenant, by means of which the tenant is enabled to carry on the farm, and in consideration of which he becomes bound to return articles equal in quantity and quality at the expiration of the lease. The origin of the term is uncertain.

Steele, Sir Richard, an English essayist, was born at Dublin in 1672, where his father was an attorney; he died in 1729. By the influence of his uncle, who was secretary to

the Duke of Ormonde, Steele was educated at the Charter-house, where he formed a friendship with Addison, and at Oxford. After three years spent at the university he left without taking his degree, and in 1694 enlisted as a private in the Royal Horse Guards. He soon after gained the favour and patronage of Lord Cutts, colonel of the Coldstream Guards, who made him his secretary and aide-de-camp, and appointed him an ensign in his own regiment. In 1702 he obtained a captaincy in Lord Lucas's newly-raised regiment of fusiliers. Shortly before this time (1701) he published a prose treatise called *The Christian Hero*, the object of which was to reform the manners of the time. Its severe morality, however, brought ridicule upon its author (who was by no means over-strict in his own conduct), and, to establish his character as a wit, he wrote the comedies of *The Funeral*, *The Lying Lover*, *The Tender Husband*, and a number of years afterwards he added to these *The Conscious Lovers*. In 1707 he was appointed, by the influence of Addison, to the editorship of the *Gazette*. Two years later he started, and was afterwards aided by Addison in maintaining, a light miscellany called *The Tatler*, which, with its successors *The Spectator* and *The Guardian*, established the fame of the two friends as the first of English essayists. As a zealous Whig Steele entered parliament, but he was expelled (1714) for the alleged seditious of his pamphlet called *The Crisis*. In the following year his fortunes improved when the Hanoverian party came into power, and he became deputy-lieutenant of Middlesex, and was knighted. Various were the journals which he started, such as *The Reader*, *The Englishman*, *Town Talk*, and *The Plebeian*, and among his pamphlets was an *Apology for myself and my writings* (1714). Notwithstanding the lucrative positions which he held under the government, and the fact that he received a fortune with both his wives, the impulsive free-handedness of Steele brought him constantly into financial difficulties. For this reason he was obliged to retire from London into Wales, where he died. See *Addison*.

Steel Engraving. See *Engraving*.

Steell, Sir JOHN, R.S.A., Scottish sculptor, was born at Aberdeen in 1804; received his art education in the Royal Academy, Edinburgh, and also in Rome. In the competition for a statue of Sir Walter Scott he gained the prize with the figure now seated

in the Scott Monument in Edinburgh, and from the time of its completion (1846) his success was assured. Among his better-known works, also in Edinburgh, are the statues of Wellington (1852), Professor Wilson, Allan Ramsay, Thomas Chalmers, Queen Victoria, and the Scottish memorial to the Prince Consort, for which in 1876 the artist was knighted. He died in 1891.

Steel Toys, a technical term used for small articles of steel as buttons, buckles, &c., manufactured chiefly in London and Birmingham.

Steelyard, formerly a factory in London belonging to the Hanse merchants, who had long valuable trading privileges, and a certain measure of self-government, the internal discipline of their factory being half monastic and half military. Their factory was walled, and to this the Hanse merchants more than once owed their safety in popular risings, when Flemings and other foreigners were massacred. After the decline of the Hanse Towns (which see) the Steelyard remained in the possession of the free towns of Lübeck, Hamburg, and Bremen till 1853, when it was sold to some private speculators.

Steelyard, or ROMAN STEELYARD. See *Balance*.

Steen (stēn), JAN, Dutch painter, born at Leyden about 1626, died in 1679. He studied under Nicolas Knauper and Van Goyen, and married the daughter of the latter. From the conflicting accounts of his career it appears that he was at one time a tavern-keeper, and the tradition is that he led a drunken and dissolute life; but in disproof of this his numerous paintings attest that he must have been a laborious and careful worker. He stands in the foremost rank among Dutch painters alike as regards execution, composition, and colour, and the action, gestures, and expression of his figures. In the British National Gallery he is represented by *The Music Master*, but his chief paintings are to be seen in the galleries of the Hague and Amsterdam.

Steenbok. See *Steinbok*.

Steeple, any tower-like structure attached to a church, whether a tower proper or spire or a combination of tower and spire or tower and lantern.

Steeple-chase, a kind of horse-race across a difficult tract of country in which ditches, hedges, fences, and other obstacles have to be jumped as they come in the way. It is said that the name is derived from the fact that originally any conspicuous object, such

as a church-steeple, was chosen as a goal, towards which those taking part in the race were allowed to take any course they chose. The steeple-chase course of the present day is marked out by flags, between which the rider must pass before he can win the race.

Steerage, an apartment or space in the 'tween-decks of a ship forward of the main or chief cabin. In passenger ships it is assigned to the inferior class of passengers.

Steering Apparatus, the contrivance by which a vessel is steered, usually composed of three parts, viz. the rudder, the tiller, and the wheel, except in small vessels, where the wheel is unnecessary. The rudder or helm is a long and flat piece or frame suspended edgewise down the hind part of a ship's stern-post, where it turns upon a kind of hinge to the right or left, serving to direct the course of a vessel, as the tail of a fish guides the body. The tiller is a bar of timber or iron, fixed horizontally to the upper end of the rudder and projecting within the vessel. The movements of the tiller are effected in small vessels by hand, assisted by a sort of tackle called the tiller-rope. In larger vessels there are properly speaking two ropes, or more commonly chains, which being wound about the axis or barrel of a wheel, act upon the tiller with the powers of a windlass. In the enormous modern vessels a ponderous system of braces and tackle became necessary to assist the working of the wheel. This was remedied by the introduction of hydraulic or steam-steering apparatus, which is a device interposed between the tiller-wheel and the rudder-head. There are numerous forms of apparatus, and by many mechanical improvements in steering machinery, manual labour at the wheel is now reduced to a minimum.

Steevens, GEORGE, a Shaksperian critic, born at Stepney in 1736, died in 1800. He was educated at King's College, Cambridge, and in 1766 he published *Twenty of the Plays of Shakspeare* in four vols. After this he was associated with Dr. Johnson in an edition of Shakspeare published in 1773. He then prepared a corrected text of the dramatist's works in fifteen vols., which remained for a long time the standard edition.

Steiermark, or STEYERMARK. See *Styria*.

Stein (stīn), HEINRICH FRIEDRICH KARL, BARON VON, German statesman, born at Nassau 1757, died 1831. He studied at Göttingen, entered the mining department of the Prussian government, became head

of the mines and manufactures (1784) department in Westphalia, visited the mining districts of England in 1786, became president of the provincial chambers of Westphalia in 1796, and a minister of state in 1804. For the severity of his criticisms on the administration he was dismissed (1807), but in a few months he was recalled, with power to introduce his reforms. Accordingly he abolished serfage by edict, made military service obligatory on all classes, and rearranged the financial and administrative affairs. By means of these reforms he laid the basis of Prussia's future greatness, but in less than a year he was proscribed by Napoleon and dismissed from office. He afterwards visited St. Petersburg, and was instrumental in bringing about the coalition which crushed Napoleon. When the military struggle was over he spent his life in retirement. See *Prussia*.

Steinbock (stīn'bok), STEENBOK (stān'bok; *Namotragus campestris*), a small antelope found in South Africa. It is ashen gray on the sides, white underneath, stands about 2 feet in height, and its flesh is much esteemed. The male alone has short horns. The name is also applied in Europe to the ibex (which see).

Stela, STELE, in architecture, a small column without base or capital, serving as a monument, a milestone, and the like.

Stelvio, PASS OF THE, a military road leading over the Rhaetian Alps between the Tyrol and Lombardy, constructed by the Austrian government and completed in 1824.

Stem, a curved piece of timber or combination of timber to which the two sides of a ship are united at the fore end, or the similar portion of an iron or steel vessel. The outside of the stem is usually marked with a scale of feet showing the perpendicular height from the keel.

Stem, in botany, the axis of growth of a plant above ground. The stem may be either herbaceous or woody, solid or hollow, jointed or unjointed, branched or simple, upright or trailing, &c. In some plants the stem is so short as to seem to be wanting, the leaves and flower-stalks appearing to spring from the top of the root. There are also stems, such as the rhizome and tuber, which, being subterranean, have been mistaken for roots. See *Botany*.

Stencil, a thin plate of metal, leather, or other material, used in painting, marking, &c. The pattern is cut through the material composing the stencil, which is applied to

the surface to be painted. The brush then being brought over the stencil, only the interstices representing the pattern receive the colours.

Stendal, a town in Prussia, province of Saxony, on the Uchte, 40 miles N.N.E. of Magdeburg. It has a cathedral of the 12th century, and manufactures of cloth, agricultural machines, starch, &c. Pop. 22,075.

Stenness, or **STENNIS**, a loch in Orkney, a few miles N.E. of Stromness, 14 miles in circumference. It is remarkable for the two groups of standing stones, somewhat similar to those of Stonehenge, which are found on its shores. The smaller group, of which only two remain erect, belong to an area 100 feet in diameter with an outside ditch 50 feet in width. The larger group, known as the Ring of Brogar, consists now of fifteen stones in an inclosure 340 feet in diameter. See *Standing Stones*.

Stenography. See *Shorthand*.

Stentor, a genus of infusorial animalcules. They are among the largest of the Infusoria, and are usually found adhering to the stems and leaves of aquatic plants.

Stephen (stē'ven), King of England, son of Stephen, Count of Blois, by Adela, a daughter of William the Conqueror, was born about 1097. His uncle Henry I. gave him the earldom of Mortaigne, in Normandy, and large estates in England, in return for which he took the oath for securing the succession to Henry's daughter, the Empress Matilda. Yet when his uncle died he hastened from France to England and laid claim to the crown for himself (Dec. 1135), and was crowned in London. Nevertheless his seat on the throne, by reason of the disaffection of many of the nobility, was very insecure. Besides this, in 1138 David of Scotland invaded England to secure the claims of his niece, but in the battle of the Standard he was defeated by the northern barons (Aug. 22). In the following year the empress herself landed in England with her half-brother, the Earl of Gloucester, and a civil war ensued, in which Stephen was taken prisoner and Matilda acknowledged queen. The conduct of the new sovereign, however, excited an insurrection against her government; and, being shut up in Winchester Castle, she escaped with difficulty, while the Earl of Gloucester was taken prisoner. Stephen was exchanged for the earl, and the war was renewed. When Matilda retired to Normandy (about 1147) the contest was taken up by her son Henry. Finally

the struggle was brought to an end in 1153 by the Treaty of Wallingford, in which it was agreed that Stephen should reign to his death, and that he should be succeeded by Henry. He died the following year.

Stephen, **SIR JAMES**, was born in London in 1789, and died in 1859. He was educated at Cambridge, practised as a barrister, became under-secretary (1834) for the colonies, and on his retirement he was appointed professor of modern history in Cambridge University. He was the author of *Essays in Ecclesiastical Biography* (1849) and *Lectures on the History of France* (1851).—His brother, **SIR GEORGE** (1794–1879), after studying medicine became an attorney, and latterly a barrister; distinguished himself as an advocate for the abolition of slavery, and in bringing about reforms in connection with the police force and pauper relief; and was knighted in 1837.—**SIR JAMES FITZ-JAMES STEPHEN**, son of Sir James, born in 1829, died in 1894; educated at Trinity College, Cambridge; called to the bar in 1854; became recorder of Newark-on-Trent (1859); legal adviser to the Indian Council (1869); professor of common law at the Inns of Court (1875); and a judge of the High Court of Justice (1879). He is the author of *Essays of a Barrister* (1862); *General View of the Criminal Law of England* (1863); *A Digest of the Law of Evidence* (1876); *A Digest of the Criminal Law* (1877); and a *History of the Criminal Law of England* (1883).—**SIR LESLIE STEPHEN** (K.C.B., 1902), his brother, born in 1832; educated at Eton, King's College, London, and Trinity Hall, Cambridge; graduated M.A. in 1857, and became fellow and tutor. Devoting himself to literature, he edited the *Cornhill Magazine* in 1871–82, and the *Dictionary of National Biography* during 1882–91. He died in 1904. His writings include *The Playground of Europe* (1871); three series of *Hours in a Library* (1874–79); *History of English Thought in the 18th century* (1876); *The Science of Ethics* (1882); *lives of Pope, Swift, and Johnson in the English Men of Letters series*; *Life of Henry Fawcett* (1885); *An Agnostic's Apology* (1893); *Studies of a Biographer* (1898); and *The English Utilitarians* (1900).—**HENRY JOHN**, a brother of Sir James and Sir George, serjeant-at-law, born 1787, died 1864, was author of *New Commentaries on the Laws of England* (four vols., 1841–45), often republished and quoted as a standard authority.

Stephen, St. There are three saints of this name in the calendar, viz.: (1) The martyr whose death is recorded in the Acts of the Apostles, chapters vi. and vii., and whose festival is held on Dec. 26; (2) Stephen, a pope from 253 to 257 (his day is the 2d of August); and (3) Stephen the king (Stephen I. of Hungary), a popular saint in Hungary and South Germany.

Stephen Bathori. See *Bathori*.

Stephens, STEPH'ANUS (English and Latin forms of *Estienne* or *Etienne*), the name of a notable French family of printers and scholars, the founder of which was Henry Stephens, who established himself in Paris about 1502. He was succeeded by his second son ROBERT (1503-59), who printed and published an edition of the New Testament (1523), a Latin Bible in folio (1528), his *Thesaurus Linguae Latinae* (1532), and in 1539 he was appointed king's printer. Of the whole Bible he printed some eleven editions. He in turn was succeeded by his eldest son HENRY (1528-98), who visited Italy, Flanders, and England, and was instructed in all the learning of the time. In 1551 he joined his father, who latterly had settled in Geneva, and published an enormous amount of work, among which were some fragments of Greek historians, *Apologie pour Herodote* (1566), a great *Thesaurus Linguae Graecae* (1572), *Plutarch* (1572), and *Plato* (1573).

Stephens, JOHN LLOYD, an American author, was born at Shrewsbury, New Jersey, in 1805, and died in 1852. He graduated in 1822 at Columbia College; studied law, and practised for eight years at the bar in New York. To recruit his health he made an extended journey through Europe and the East, an account of which he supplied in letters to Hoffman's *American Monthly Magazine*, and afterwards published in fuller narrative form under the title of *Incidents of Travel in Egypt, Arabia Petraea, and the Holy Land* (1837), and *Incidents of Travel in Greece, Turkey, Russia, and Poland* (1838). In the following year he was sent by the United States government to negotiate a treaty with the government of Central America; and as the result of his experiences and investigations in that country he published *Incidents of Travel in Central America, Chiapas, and Yucatan* (1841); and after further exploration he issued *Incidents of Travel in Yucatan* (1843), both of which were valuable contributions to our knowledge of the ruined cities

and monuments of this part of America. He was afterwards chiefly associated with the company which constructed a railway across the Isthmus of Panama.

Stephenson (sté'vn-sun), GEORGE, engineer, was born at Wylam, near Newcastle, in 1781, and died in 1848. In his fourteenth year he became assistant to his father, who was fireman at a colliery, and in 1812 he was appointed to manage the engine at Killingworth Colliery. Meanwhile he had been educating himself, chiefly in the science of mechanics, with the result that he obtained permission from Lord Ravensworth to construct a travelling engine for the colliery tramway. This he accom-



George Stephenson.

plished in 1814, and next year he introduced a great improvement in the shape of the steam-blast. In 1822 he succeeded in inducing the projectors of the Stockton and Darlington Railway to adopt an improved locomotive. He was then employed to construct the Liverpool and Manchester Railway, the directors of which accepted his locomotive called the *Rocket*, which at the trial trip in 1830 ran 29 miles in an hour. He was afterwards identified with numerous railway undertakings, and he was also the inventor of a miner's safety-lamp.—ROBERT, his son, born in 1803, died 1859. He was educated at Newcastle; apprenticed to a coal-viewer at Killingworth, and attended the science classes in Edinburgh University. Afterwards he assisted his father in the survey of various railway lines; and was subsequently employed in railway undertakings both at home and abroad. His most

notable engineering achievements were the construction of the high-level bridge at Newcastle-on-Tyne, the railway bridge at Berwick-on-Tweed, the tubular bridge over the Menai Straits, and the Victoria tubular bridge over the St. Lawrence in Canada.

Steppes, a Russian name applied to those extensive plains which, with the occasional occurrence of low ranges of hills, stretch from the Dnieper across the south-east of European Russia, round the shores of the Caspian and Aral Seas, between the Altai and Ural chains, and occupy a considerable part of Siberia. In spring they are covered with verdure, but for most of the year they are dry and barren.

Sterculia cææ, a natural order of poly-petalous exogens, allied to Malvaceæ. The



Sterculia Chicha.

plants of this order are trees or shrubs, with alternate, stipulate, simple, and often toothed leaves, with a variable inflorescence. They are natives of tropical and sub-tropical regions. The most important member of the order is the cacao-tree; others are the kola tree, the baobab, the durian, and the silk-cotton tree. The species here illustrated, a native of South and Central America, yields edible seeds as large as a pigeon's egg.

Stere (stâr), the French unit for solid measure, equal to a cubic metre, or 35·3156 cubic feet.

Stereobate, in architecture, a kind of continuous pedestal at the bottom of a plain wall: distinguished from a *stylobate*, under a series of columns or pilasters.

Stereographic Projection, that projection of the sphere which is represented upon the plane of one of its great circles, the eye being situated at the pole of that great circle.

Stereoscope, an optical apparatus which enables us to look at one and the same time upon two photographic pictures nearly the same, but taken under a small difference of angular view, each eye looking upon one picture only; and thus, as in ordinary vision, two images are conveyed to the brain which unite into one, the objects being thus represented under a high degree of relief. A reflecting form of stereoscope was invented by Wheatstone in 1838. Subsequently Brewster invented the refracting stereoscope, based on the refractive properties of the halves of double-convex lenses. This is the one now in general use. There are many forms of it, but it is generally a kind of small box furnished with two tubes containing each the half of a lens through which the eyes look upon the two pictures at the back of the box. When the tubes are adjusted to suit the eye the observer takes the one picture into the right eye and the other into the left eye, but the perceptive faculty apprehends only one image, and that in bold substantial relief and intensity.

Stereotype. See *Printing*.

Sterlet, a ganoid fish of the Caspian and various rivers in Russia, the *Acipenser ruthenus*, a species of sturgeon, highly esteemed for its flavour, and from whose roe is made the finest caviare. See *Sturgeon*.

Sterling, an epithet by which English money of account is distinguished, signifying that it is of the fixed or standard national value; as, a pound *sterling*.

Sterling, JOHN, a poet and essayist, born at Kames Castle, Island of Bute, in 1806; died 1844. He was the son of Edward Sterling, subsequently editor of the Times; received his education at Glasgow and Cambridge Universities; became for a short time editor of the Athenæum; took orders in the church and was ordained (1834) curate to Julius Hare at Hurstmonceaux; afterwards went abroad for his health and published a volume of poems (1839), as also the tragedy of Strafford (1843). He is now known chiefly as the subject of Carlyle's Life of John Sterling (1851), which was in some sort a reply to the Memoir of Sterling written by Archdeacon Hare.

Stern, the posterior part of a ship, or that part which is presented to the view of a spectator standing behind the vessel.

Sternberg, a town of Austria, in Moravia, 10 miles N.W. of Olmütz. It has important manufactures of linen, cotton, hosiery, and liqueurs. Pop. 15,220.

Sternbergia, a fossil plant, probably monocotyledonous, allied to the Pandanaceæ or screw-pines, occurring in the sandstones of the coal-measures.

Sterne, LAURENCE, an English humorist, son of a Lieutenant in the army, was born at Clonmel, Ireland, in 1713; died in London in 1768. He lived for part of his boyhood in Ireland, and afterwards being handed over to the care of a relative in Yorkshire, was put to school at Halifax in 1722, whence he removed to Jesus College, Cambridge. He took his degree of M.A. in 1740, received holy orders, and, through the interest of Dr. Jacques Sterne, his uncle, a prebendary of Durham, he obtained the living of Sutton, in Yorkshire, and also a prebend of York. Subsequently, by the interest of his wife, whom he married in 1741, he obtained the neighbouring living of Stillington, at which and at Sutton he performed the clerical duties for nearly twenty years. During this period he was quite unknown as an author. In 1759 appeared the two first volumes of his longest work, *The Life and Opinions of Tristram Shandy*, which, by their humour, whimsicality, and happy audacity of tone and treatment, gained instant popularity. A third and fourth volume appeared in 1761, a fifth and sixth in 1762, a seventh and eighth in 1764, and a ninth, singly, in 1766. From the publication of the first volumes of *Tristram Shandy*, Sterne lived mostly in London or on the Continent, for a considerable time apart from his wife and daughter, who also were not with him at his death. His other writings are *A Sentimental Journey through France and Italy* (1768), and a number of sermons, besides letters published after his death. Though disfigured by indecency Sterne's *Tristram Shandy* and *Sentimental Journey*, especially the former, contain some of the finest humour in English literature.

Sternhold, THOMAS, one of the writers of the first metrical version of the Psalms. He was educated at Oxford, became groom of the robes to Henry VIII., and died in 1549. The principal conductor of Sternhold in this work was John Hopkins.

Sternum, in anatomy, the name of the breast-bone of vertebrate animals. In man the sternum forms the front boundary of the thorax or chest in the middle line, and to it the first seven pairs of ribs are attached. It consists in the adult of three pieces, named the *manubrium*, the *gladiolus*, and the *ensiform cartilage* or *xiphoid appendage*.

It has a concave surface posteriorly, gradually decreases in breadth from above downwards, and averages about 6 inches in length. See *Thorax*.

Stesichorus (ste-sik'o-rus), a Greek lyric poet, said to have been born at Himera in Sicily about 630 B.C., and to have died about 550 B.C. He attained high eminence in choral poetry. Only about thirty fragments of his poems are extant.

Stethoscope, an instrument used by medical men for distinguishing sounds within the thorax and other cavities of the body. In its simplest form it consists of a hollow wooden cylinder with one extremity funnel-shaped, the other with a comparatively large circular ivory plate. In using it the funnel-shaped extremity is placed upon the body of the patient, and the ivory plate to the ear of the listener, this broad plate helping to exclude foreign sounds. Flexible instruments of rubber are also used, one of these having two tubes attached to the piece which receives the sounds, these being thus conveyed to both ears simultaneously. See *Auscultation*.

Stettin, capital of Pomerania and the chief seaport in Prussia, situated on the Oder 17 miles from its entrance into the Stettiner Haft, 30 miles from the Baltic Sea, and about 90 miles by rail from Berlin. The principal part is built on the left bank of the river, while on the right bank are the suburbs of Lastadie and Silberwieze, connection being maintained by several bridges, one of which is a large railway swing bridge. The town has greatly expanded recently, especially since the removal of the extensive fortifications by which it was surrounded. Among its more notable features are the old royal palace, now occupied as government buildings, the new town-hall, two monumental gateways, several Gothic churches, exchange, theatre, &c. Its industries, which are numerous and important, include iron-founding, ship-building, machine-making (one ship-building and engineering work employs 4000 or 5000 hands), the manufacture of chemicals, cement, sugar, &c. It has been a port of some importance since the 12th century. Pop. 224,119.

Steubenville, a city of the United States, in Ohio, on the west bank of the Ohio River, 68 miles below Pittsburgh. It has woollen factories, blast-furnaces, rolling-mills, machine-shops, breweries, and there are rich mines of bituminous coal in the neighbourhood. Pop. 14,349.

Stevens, ALFRED, artist, born at Blandford, Dorsetshire, 1818; died 1875. He studied painting, architecture, and sculpture in Italy, being for some time a pupil of Thorwaldsen. On his return to England he painted portraits and numerous decorative designs, but his great work is the monument to the Duke of Wellington in St. Paul's.

Stevenson, ROBERT, engineer, born in Glasgow 1772, died 1850. He lost his father in early youth, and his mother having married Thomas Smith, who became engineer to the Lighthouse Board, he was led to study engineering, and at the age of nineteen was intrusted with the erection of a lighthouse on the island of Little Cumbrae. Having married the daughter of Mr. Smith he succeeded him in his office, and constructed no fewer than twenty-three lighthouses round the coasts of Scotland, the most notable of which was the Bell Rock Lighthouse. He wrote an account of the latter, and published several important articles in the Edinburgh Encyclopædia and the Encyclopædia Britannica.—**ALAN STEVENSON**, son of the above, born at Edinburgh 1807, died 1865. He succeeded his father as engineer to the Northern Lighthouse Commissioners, made many important improvements in lighting apparatus, designed numerous lighthouses, the most important of which is Skerryvore; and published a Treatise on Lighthouse Illumination, and numerous articles or papers.—His brother, **THOMAS**, born 1818, died 1887, wrote books and papers on scientific subjects, and made improvements in the illumination of lighthouses.—Thomas's son, **ROBERT LOUIS**, a writer of marked distinction, was born at Edinburgh in 1850; educated in the University there; was called to the Scottish bar, but devoted himself to literature, and, never robust, latterly resided in Samoa, where he died in 1894. His works include *An Inland Voyage* (1878), *Travels with a Donkey in the Cevennes* (1879), *Virginibus Puerisque* (1881); and the tales or romances, *New Arabian Nights* (1882), *Treasure Island* (1882), *Prince Otto* (1885), *Dr. Jekyll and Mr. Hyde* (1886), *Kidnapped* (1886), *The Black Arrow* (1888), *The Master of Ballantrae* (1889), *David Balfour*, *Catriona* (1893), *Weir of Hermiston* (left incomplete), besides poems (*Underwoods*, 1887; *Ballads*, 1891), memoirs, letters, &c.

Stevenston, a town of Ayrshire, Scotland, with collieries, blast-furnaces, dynamite factory, &c., adjoining. Pop. 6554.

Steward of England, LORD HIGH, was one of the ancient officers of state, the greatest under the crown. A lord high steward is now made only for particular occasions, such as a coronation or the trial of a peer.

Steward of Scotland, THE HIGH, an ancient chief officer of the crown of the highest dignity and trust. He had not only the administration of the crown revenues, but the chief oversight of all the affairs of the household. See *Stuart, Family of*.

Steward of the Household, LORD, an officer of the English royal household, who is head of the court called the Board of Green Cloth, which has the supervision of the household expenses and accounts. He selects the officers and servants of the household, and he appoints the royal tradesmen.

Stewart, BALFOUR, physicist, born at Edinburgh in 1828, died 1887. He was educated at St. Andrews and Edinburgh; engaged in mercantile affairs, and went to Australia for several years; and on his return he was appointed successively assistant to Professor Forbes in Edinburgh, director of Kew Observatory, and professor of physics in Owen's College, Manchester. Among his numerous writings are: *An Elementary Treatise on Heat* (1866); *Lessons on Elementary Physics* (1870); *Conservation of Energy* (1873); *The Unseen Universe* (1875) and *The Paradoxical Philosophy* (1878), in conjunction with Professor Tait; and *Practical Physics* (1885), in conjunction with Professor Gee.

Stewart, SIR DONALD, was born in 1824, educated at Aberdeen University, entered the Bengal Staff Corps in 1840, took part in the suppression of the Indian mutiny in 1857, and in the Abyssinian expedition of 1867-68. He commanded the Candahar column in the Afghan campaign of 1878-80, and marched with the field force from Candahar to Cabul, defeating the Afghans at Ahmed Kheyl. He was commander-in-chief in India, 1881-85, and was made field-marshal in 1894. He died in 1900.

Stewart, DUGALD, a Scottish philosopher, born at Edinburgh in 1753, died 1828. He was educated in Edinburgh, and attended the lectures of Dr. Reid in Glasgow. In 1772 he began to assist his father, who was professor of mathematics in Edinburgh University, being appointed joint-professor three years afterwards. In 1778 he agreed to lecture also as substitute for Adam Ferguson in the chair of moral philosophy, and

in 1785, when the latter resigned, Dugald Stewart received the appointment. Besides holding this position for a quarter of a century, from which he spread a fine intellectual and moral influence, Stewart was the author of *Elements of the Philosophy of the Human Mind* (1792-1827), *Outlines of Moral Philosophy* (1793), and accounts of the *Life and Writings of Adam Smith*, of Dr. Robertson, and of Dr. Reid.

Stewart, FAMILY OF. See *Stuart*.

Stewarton, a town of Ayrshire, Scotland, with manufactures of tartans, woollen bonnets, carpets, &c. Pop. 2858.

Stewartry, in Scotland, a certain extent of territory under the jurisdiction of a steward appointed by the king and having a position similar to a sheriff. The stewardry of Kirkcudbright, though bearing this distinctive name, is exactly in the same position as the other Scottish counties.

Stewing, a mode of cooking by which the meat is first covered with cold water, gently heated, and then kept slowly simmering below the boiling point until it is thoroughly cooked. If the stewing is not accomplished slowly the meat will be dry and tough.

Steyr (stir), a town of Upper Austria, at the confluence of the Steyr with the Enns, 19 miles S.E. of Linz, and about 90 miles S.W. of Vienna. Its chief industry is in iron and steel, and the making of cutlery; there is also an important small-arms factory. Pop. 17,199.

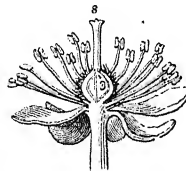
Stibnite, trisulphide of antimony, an ore consisting of 72.88 antimony and 27.12 sulphur. The colour is lead-gray or blackish, and it is very brittle. This ore is the source of most of the antimony of commerce. Called also *Antimony-glance*.

Sticking-plaster. See *Court-plaster*.

Stickleback, the popular name for certain small teleostean fishes which constitute the genus *Gasterosteus*. The species are found in the ponds and streams of Great Britain, as well as in salt-water; they are very active and voracious, and live upon aquatic insects and worms. The sticklebacks are among the very few fishes which build nests for their young. The nest is composed of straw, sticks, &c. In the top a small hole is formed, and in this the eggs, yellow in colour and about the size of poppy seeds, are deposited. The most common species is the three-spined stickleback, banstickle, or tittlebat (*G. aculeatus*, or *trachurus*), which is distinguished by the body being protected at the sides with shield-like plates, and by the possession

of three spines on the back. It varies from 2 to 3 inches in length.

Stigma, in botany, the upper extremity of the style, and the part which in impregnation receives the pollen. It is composed of cellular tissue, has its surface destitute of true epidermis, and is usually moist. In many



plants there is only one stigma, while in others there are two, three, five, or many, the number of stigmas being determined by that of the styles.

Stigmata, marks said to have been supernaturally impressed upon the bodies of certain persons in imitation of the wounds on the crucified body of Christ. St. Francis of Assisi is said to have been supernaturally marked in this way, and a similar distinction was claimed for St. Catherine of Siena.

Stil'bite, a mineral of a shining pearly lustre, of a white colour, or white shaded with gray, yellow, or red. It has been associated with zeolite, and called *foliated zeolite* and *radiated zeolite*.

Stilet'to, a small dagger with a round pointed blade from 6 to 12 inches long, introduced in the middle ages.

Stilicho (stil'i-kō), a general under the later Roman empire, was probably the son of a Vandal captain of the barbarian auxiliaries of the Emperor Valens. His prowess and military skill made him invaluable to the Emperor Theodosius. That emperor having bequeathed the Empire of the East to his son Arcadius, and that of the West to his second son Honorius, the former was left under the care of Rufinus, and the latter under the guardianship of Stilicho. At the death of the emperor (in 394 A.D.) Rufinus stirred up an invasion of the Goths in order to procure the sole dominion, which Stilicho put down, and effected the destruction of his rival. After suppressing a revolt in Africa he marched against Alaric (403 A.D.), whom he signally defeated at Pollentia, but whose claim for a subsidy from the Roman treasury he afterwards warmly supported. This conduct excited suspicion of his treachery on the part of Honorius, who massacred all the friends of Stilicho during his absence. He received intelligence of this fact at the camp of Bologna,

whence he fled to Ravenna. There, however, he was seized and put to death, 408 A.D.

Still. See *Distillation*.

Stilling. See *Jung*.

Stillingfleet, EDWARD, a learned English divine, born in 1635, died in 1699. He studied at St. John's College, Cambridge, and was successively appointed rector of Sutton in Bedfordshire (1657), St. Andrews, Holborn (1665), canon of St. Paul's (1670), archdeacon of London (1677), the following year dean of St. Paul's, and bishop of Worcester (1689). His writings, most of which are controversial, and combat the views of Roman Catholics, Nonconformists, &c., include *Irenicum*, a *Weapon-salve* for the Church's Wounds (1659), *Origines Sacrae*, or a Rational Account of the Christian Faith (1662), *Rational Account of the Protestant Religion* (1664), *The Doctrines and Practices of the Church of Rome Truly Represented* (1686), and *A Vindication of the Doctrine of the Trinity* (1697).

Stillingia, a genus of plants, natural order Euphorbiaceæ, one of the species being the famous tallow-tree of China (*S. sebifera*). See *Tallow-tree*.

Still Life, in painting, the representation of inanimate objects, such as dead animals (game, fishes, &c.), furniture, vases, sometimes with fruits and flowers in addition.

Stilt-bird, **STILT-PLOVER**, a wading bird, having remarkably long slender legs, a feature from which it derives its common name.



Stilt-plover (*Himantopus melanopterus*).

The stilt-bird of Great Britain is the *Himantopus melanopterus* of naturalists. It has a long straight bill, very long wings for its size, and the legs, which are of a red colour, measure from 18 to 20 inches.

Stilted Arch, a term applied to a form

of the arch which does not spring immediately from the imposts, but from a vertical piece of masonry resting on them so as to give to the arch an appearance of being on stilts. Arches of this kind occur frequently in all the mediæval styles.

Stilton Cheese, a well-known and highly esteemed solid, rich, white cheese, largely sold at *Stilton*, Huntingdonshire, England, but now chiefly made in Leicestershire.

Stimulants, in medicine, agents which produce a quickly diffused and transient increase of vital energy in the organism or some part of it. Stimulants are of two classes: the one comprises certain medicinal substances; the other warmth, cold, electricity, galvanism, and mental agents such as music, joy, hope, &c. In the first class ammonia, alcohol, and sulphuric ether are commonly employed as stimulants. Stimulants have also been divided into *general* and *topical*, according as they affect the whole system or a particular part.

Sting, a sharp-pointed weapon or instrument with which certain insects, bees and wasps in particular, are armed by nature for their defence. In most instances this instrument is a tube, through which a poisonous matter is discharged, which inflames the flesh, and in some instances proves fatal to life.

Sting-ray, a fish belonging to the genus *Trygon*, natural order Elasmobranchii, family Trygonidae, which is allied to that of the rays proper. It is remarkable for its long, flexible, whip-like tail, which is armed with a projecting bony spine, very sharp at the point, and furnished along both edges with sharp cutting teeth. Only one species (*T. pastinaca*) occurs in the British seas, and is popularly known as the *fire-flaire*. Another species (*Trygon centrura*) is common on the eastern coasts of N. America. These fishes sometimes inflict serious wounds with their tail.

Stink-ball, a preparation of pitch, rosin, nitre, gunpowder, colophony, asafœtida, and other offensive and suffocating ingredients, placed in earthen jars, formerly used for throwing on to an enemy's decks at close quarters, and still in use with Eastern pirates.

Stint (*Tringa*), a grallatorial bird, a species of sandpiper. Temminck's stint (*Tringa Temminckii*) is the smallest species of the British sandpipers, length 5½ inches. It inhabits the edges of lakes and inland rivers, and is said to breed in North Europe.

Stipe, in botany, the foot-stalk of the fronds of ferns, as also the stem which carries the pileus of such fungi as the agarics.

Sti'pend, in Scotland, a term applied specifically to the provision made for the support of the parochial ministers of the Established Church. It consists of payments made in money or grain, or both, varying in amount according to the extent of the parish and the state of the free teinds, or of any other fund specially set apart for the purpose.

Stipendiary Magistrate, in Britain, a paid magistrate acting in towns under appointment by the home-secretary, and dealing with breaches of the peace, &c.

Stipple, in engraving, a mode of producing the desired effect by means of dots; also called the *dotted style*, in contradistinction to *engraving in lines*. See *Engraving*.

Stip'ule, in botany, a small leaf-like appendage to a leaf, commonly situated at the base of the petiole in pairs, one on each side, and either adhering to it or standing separate. They are usually of a more delicate texture than the leaf, but vary in this respect as well as in form and colour. They are not found in all plants, but where they occur they frequently characterize a whole family, as in Leguminosæ, Rosaceæ, Malvaceæ, &c.

Stirling, a royal and parliamentary burgh of Scotland, capital of the county of the same name, situated on a height overlooking the winding course of the river Forth, and 31 miles N.W. from Edinburgh. The town consists of an ancient portion formed of steep winding streets, and a modern portion built on the lower ground. The most important edifice is the castle, on a rocky eminence, which rises 220 feet above the plain, and terminates precipitously on the north-west side of the town. The principal parts of it as they now stand are the royal palace (rebuilt after a fire in 1855); the Parliament House, once a noble fabric, but now converted into mess-rooms and other accommodations; the chapel-royal, now used as store-rooms; and another palace begun by James IV., and finished by his granddaughter Mary. Other objects deserving of notice are the old church, with a massive and lofty tower; the North Parish Church; two old buildings called Mar's Work and

Argyll's Lodgings; handsome county buildings; town-hall; the Smith Institute, with library, reading-room, museum and picture-gallery; a new public hall, &c. The principal manufactures are woollens, carpets, leather, ropes, carriages; and there is a small shipping trade. It unites with Dunfermline, Culross, Inverkeithing, and S. Queensferry in sending a member to parliament. Pop. of parl. burgh (including St. Ninian's), 18,421. —The county of Stirling is bounded by the counties of Perth, Clackmannan, Linlithgow, Lanark, and Dumbarton, and occupies a central position in Scotland. It has an area of 296,845 acres. The valley of the Forth, along the northern boundary, and the eastern part of the county are well cultivated, the middle portion is largely occupied by the Campsie and other hills, while a projection extends northwards and includes Ben Lomond and parts of Loch Lomond and Loch Katrine. The chief river is the Forth; other streams are the Avon, Allan, Bannock, Blane, Carron, and Endrick. The coal-fields of the south-east are extensive, ironstone, fire-clay, and oil-shale are found, and limestone is wrought in the Campsie district. There are important manufactures of woollen and iron goods, chemicals, machinery, &c. (Falkirk being the chief industrial centre); breweries and distilleries, and at Grangemouth there are extensive docks. The county returns one member to parliament. Pop. 142,291.

Stirling, JAMES HUTCHISON, born in Glasgow in 1820; educated in arts and medicine in Glasgow University, France, and Germany; practised as a surgeon in Wales, but ultimately devoted himself to literary and philosophical studies. He died in 1909. He is author of *The Secret of Hegel* (1865); *Sir Wm. Hamilton, being the Philosophy of Perception* (1865); *Jerrold, Tennyson, Macaulay, and other Essays* (1868); *As regards Protoplasm* (1869); *The Philosophy of Law* (1878); *Burns in Drama, together with Saved Leaves* (1878); *The Community of Property* (1885); *Philosophy and Theology* (the Gifford Lectures, 1890); and translator of Schwegler's *History of Philosophy*, and Kant's *Critique of Pure Reason* in his Text-book to Kant.

Stirpes, **SUCCESSION BY**, a term in Scots law meaning that inheritance is divided among different families or *stirpes* instead of among individuals.

Stirrup, a strap or something similar hanging from a saddle, and having at its



Leaf with Stipules, ss.

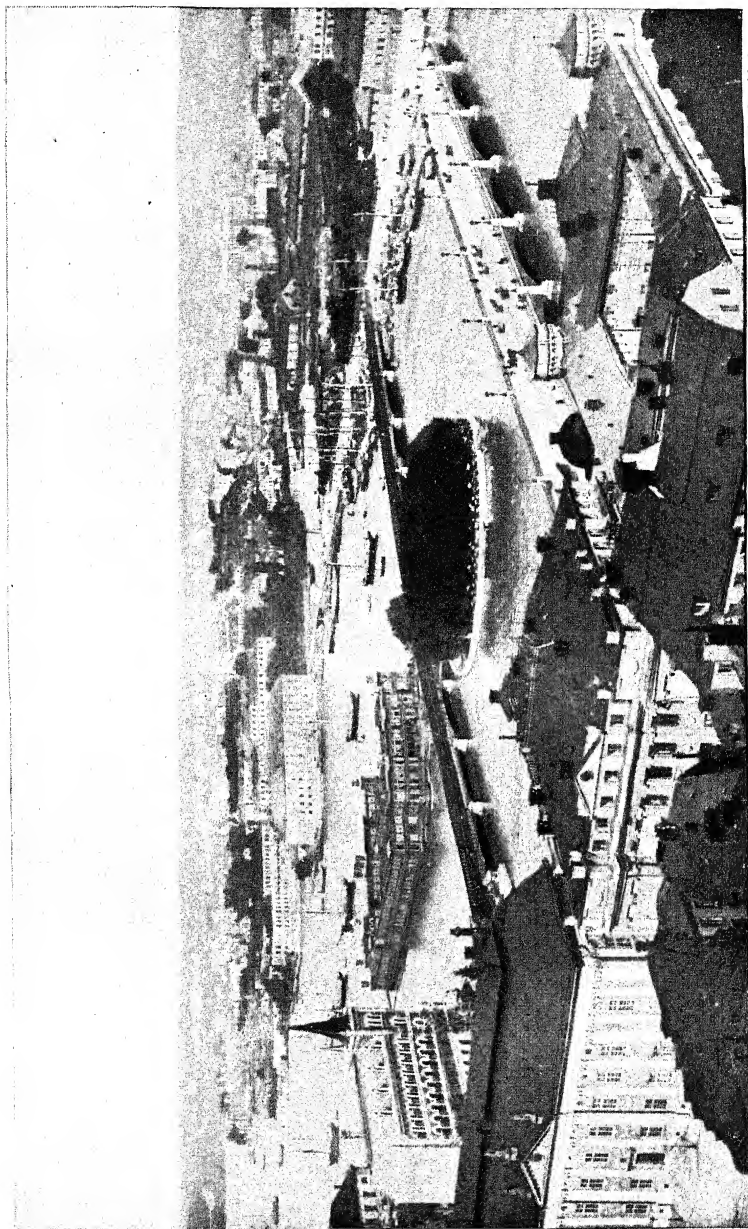
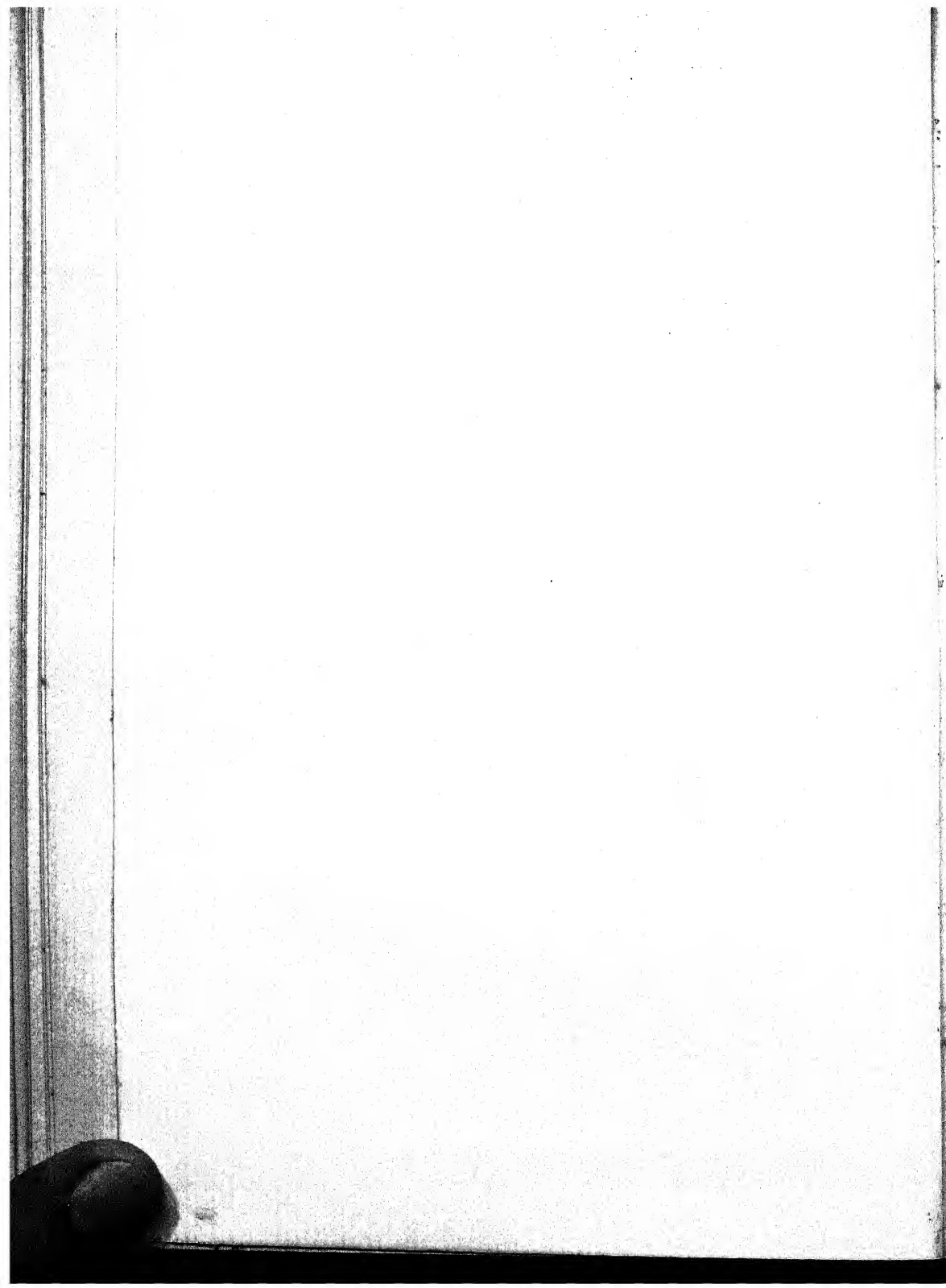


Photo. Lindahl, Stockholm

STOCKHOLM : GENERAL VIEW



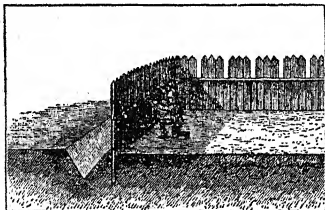
lower end a suitable appliance for receiving the foot of the rider, used to assist persons in mounting a horse, and to enable them to sit steadily in riding. Ancient writers make no mention of stirrups, and they are first known to have been used in Europe in the 6th century A.D. They were in use among the Anglo-Saxons, and by the 12th century they were common.

Sti'ver, an old Dutch coin and money of account worth about a penny of English money.

Stoat. See *Ermine*.

Stock, a name originally applied to a cruciferous garden plant, *Matthiola incana* (called more fully *stock-gillyflower*), but now extended to the various species of *Matthiola*, and to certain allied plants of the same order. They are herbaceous or shrubby, biennial or sometimes perennial, and have single or double fragrant flowers. *M. incana* is probably the parent of the greater number of the hoary-leaved varieties cultivated in Britain, and known as Brompton stock, queen stock, &c. *M. annua* is the source of the common or ten weeks' stocks, and *M. græca* of the smooth-leaved annual stocks. The Virginia stock (*Malcolmia maritima*) has been introduced from the Mediterranean, and like the species already mentioned is a great favourite in the flower-garden on account of its beauty and fragrance.

Stockade, in fortification, a fence or barrier constructed by planting upright in the



Stockade.

ground trunks of trees or rough piles of timber so as to inclose an area which is to be defended.

Stock-dove (*Columba ænas*), a wild European pigeon about 13 inches in length, and with a general bluish gray plumage, the breast being purplish. It raises two or three broods in a season, and builds its nest in a tree-stump or in a rabbit-burrow.

Stock Exchange, a market for the pur-

chase and sale of public stocks, shares, and other securities of a similar nature. In London during the 18th century transactions of this kind were conducted in and about the Royal Exchange, but in 1773 the stockbrokers in the form of an association removed first to Sweeting Alley and then to Capel Court, Bartholomew Lane. There a new building was erected in 1801, and with the great increase of business the premises have since been repeatedly extended. The business of the London Stock Exchange is managed by a committee of thirty appointed annually by ballot. The members, of which there are about 2500, are also elected by ballot, and are either *jobbers* or *brokers*. The former deal in stocks at the market price, while the latter transact business between the jobbers and the outside public. All such business must be conducted according to the forms of the 'house,' and by its own members. The settlement of accounts between jobbers and brokers takes place fortnightly, the time for settlement extends over four days, and the special dates are arranged by the committee each month. There are now similar institutions in all large cities of the United Kingdom, America, &c. See also *Stock-jobbing*.

Stock-fish, the name given in commerce to salted and dried cod, hake, ling, and other fish of the same family.

Stockholm, the capital of Sweden, beautifully and picturesquely situated between Lake Mälär and the Baltic, 330 miles north-east of Copenhagen. It stands partly on the north and south sides of the strait that communicates between the lake and the sea, and partly on several islands, which are connected with the mainland and with each other by a number of bridges. The oldest and densest part of the city is built on the island of Gustavsholm (usually called the Staden), and on the smaller adjacent islands of Riddarsholm, and Helgeandsholm. The Staden, or 'the city,' is the commercial centre, and contains the custom-house, bank, exchange, town-hall, &c. On its eastern side is a long quay, called the Skeppsbron, used as the landing-place for sea-going steamers, &c. Norrmalm on the north (with its eastern and western extensions of Ladugårdslandet and Kungsholmen), Södermalm on the south, and the island of Djurgården in the east, are important suburban extensions of the city proper. The chief public building is the royal palace, a fine edifice in the Italian style, situated upon

Gustavsholm; other noteworthy edifices are the National Library, National Museum, Academy of Arts and Sciences, parliament-house, &c. The educational institutions include a medical college, a technological institute, navigation school, school of design, &c. The environment of the city with its numerous water-ways and bridges is suggestive of Venice, and its picturesque islands have been made beautiful by many promenades and parks, the most beautiful of which is the Djurgarden. It is besides a place of considerable trade, and has manufactures of woollen, linen, cotton, silk, porcelain, glass, tobacco, iron castings, &c. Stockholm was founded about 1260. Pop. 337,500.

Stockings, a close-fitting covering for the foot and leg, anciently made of cloth or milled stuff sewed together, but now knitted by the hand or woven in a frame, the material being wool, cotton, or silk.

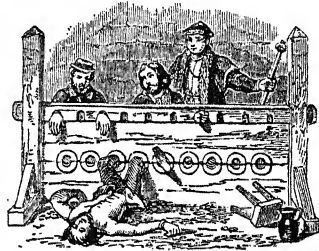
Stock-jobbing, the practice of dealing in stocks or shares, especially by persons who buy and sell on the Stock Exchange on their own account and not for clients, as do the stockbrokers properly so-called. The transactions carried out are often entirely of a gambling nature, and the jobber may neither have stock of his own to buy nor to sell. This business is now carried on to an amazing extent, and is of this character:—A. agrees to sell B. £10,000 of bank stock, for instance, to be transferred in twenty days, for £12,000. Now if the price of bank stock on the day appointed for transfer should be only £118 per cent, he may then purchase as much as will enable him to fulfil his bargain for £11,800, and thereby gain £200 by the transaction. Should the price of bank stock, however, advance to £125 per cent, he will have to pay £12,500 for the necessary amount of stock and will thus lose £500 by completing his agreement. In effect, the stock is usually never transferred; the difference between the price of the stock on the day of delivery and the price bargained for being simply paid to one or other of the parties to the bargain. See *Bulls and Bears*, *Backwardation*, *Contango*.

Stock-list, a list published daily or periodically in connection with a stock-exchange, enumerating the leading stocks dealt in, the prices current, the actual transactions, &c.

Stockport, a parl., mun., and county borough of England, partly in Cheshire and partly in Lancashire, 5 miles south-east of Manchester, on the Mersey. It occupies an

elevated site, on which the houses rise in irregular tiers, giving it a picturesque appearance. Its chief structures are St. Mary's Church, Christ Church, the free grammar-school, the Sunday-school, the free library, the museum situated in Vernon Park, and the immense railway viaduct which here crosses the Mersey. The cotton trade, connected with which are spinning, weaving, dyeing, &c., is the staple, and there are also foundries, machine shops, breweries, &c. It sends two members to parliament. Pop. (area recently extended), 92,832.

Stocks, an apparatus formerly used for the punishment of petty offenders, as vagrants, trespassers, and the like. It usually



Prisoners in the Stocks.

consisted of a frame of timber with holes in which the ankles, and sometimes both the ankles and wrists, of the offenders were confined.

Stocks, LUMB, engraver, born 1812, died 1892; studied engraving, and was for a time chiefly engaged on plates for the annuals and similar publications. Subsequently he was engaged on line engravings for the Art Journal and several art-unions, and engraved many important works by Webster, Maclise, Wilkie, Mulready, Faed, Ward, Horsley, Noel Paton, &c. He was elected an associate engraver of the Royal Academy in 1853, and academician in 1872.

Stockton, a city of the U. States, California, about 50 miles S.S.E. of Sacramento. It is the centre of a considerable trade, especially in wheat. Pop. 17,506.

Stockton (STOCKTON-ON-TEES), a parliamentary and municipal borough and seaport, England, mainly in county of Durham, on the Tees, which is spanned by a fine iron bridge. It is well built, and has a town-house, borough-hall, exchange, custom-house, many fine churches and chapels, &c. Owing to its proximity to the Cleveland

district, the town has grown rapidly, and has extensive iron-works, foundries, engineering works, ship-building yards, potteries, bottle-works, &c. The river now admits vessels of some size. Stockton sends one member to parliament, the parl. bor. including S. Stockton on the south bank of the Tees, in Yorkshire, incorporated as a mun. bor. in 1892 under the name of Thornaby-on-Tees. Pop. mun. bor., 51,476; parl. bor., 71,812; Thornaby, 16,053.

Stockton, FRANK RICHARD, American author, born at Philadelphia, 1834; attained much popularity by his short stories, which are very numerous, among the best known being the Rudder Grange stories, *The Lady or the Tiger?* *The Ting-a-ling Stories*, &c. He also wrote several novels, and stories for children. He died in 1902.

Stoddard, RICHARD HENRY, American poet, born 1825, died 1903; worked in an iron-foundry, was afterwards in New York custom-house; began in 1848 to write for periodicals, and finally devoted himself to literature. Among his writings are: *Foot-prints* (1849); *Songs of Summer* (1856); *The King's Bell* (1862); *The Book of the East* (1871); *Memoir of E. A. Poe* (1875); *Poems* (1880); *Life of Washington Irving* (1886).

Stoics, a sect of philosophers which flourished first in Greece and subsequently in Rome, so called from the porch or *Stoa*, at Athens, where Zeno, its founder, taught. It was about B.C. 308, fourteen years after the death of Aristotle and thirty-nine years after the death of Plato, that Zeno laid the foundation of the new school. He lived to a great age, and was held in much esteem by the Athenians, but none of his works have been preserved. His two most eminent disciples were Cleanthes and Chrysippus, who developed and systematized the Stoic doctrines. These were carried to Rome by Panætius of Rhodes, whose disciple Posidonius was the instructor of Cicero. Cato of Utica and Brutus also embraced Stoicism, and its chief teachers among the Romans were Cicero, Seneca, Epictetus, and Marcus Aurelius. The Stoics are proverbially known for the austerity of their ethical doctrines, which, indeed, quite overshadowed all the rest of their philosophy. With Zeno and his disciples the system appears to have been an attempt to reconcile a theological pantheism and a materialist psychology with a logic which seeks the foundations of knowledge in the representations or perceptions of the senses, and a morality which

claims as its first principle the absolute freedom of the human will. Transferred to the Roman world, this philosophy became a practical rule of life. To Epictetus and the Stoics of the later empire the supreme end of life, or the highest good, is virtue, that is, a life conformed to nature, the agreement of human conduct with the all-controlling law of nature, or of the human with the divine will; not contemplation, but action, is the supreme problem for man; virtue is sufficient for happiness, but happiness or pleasure should never be made the end of human endeavour. The great struggle of Stoical morality is to subdue all emotion, which in itself is contrary to nature, entirely without utility, and productive only of evil. The wise man alone attains to the complete performance of his duty; he is without passion, although not without feeling; he is not indulgent, but just toward himself and others; he alone is free, having entirely subdued his passions, which are the great barrier to liberty; he is king and lord, and is inferior in inner worth to no other rational being, not even to Zeus himself.

Stokes, SIR GEORGE GABRIEL, BART., scientist, born in Sligo, Ireland, 1819; was educated at Bristol and at Cambridge, taking his degree in 1841 as senior wrangler and first Smith's prizeman. In 1849 he was appointed Lucasian professor of mathematics at Cambridge. He became a member of the Royal Society in 1851, was awarded the Rumford medal for his investigations on light, and was president of the Royal Society from 1885 to 1890. He was president of the British Association in 1869. In 1889 he was created a baronet. In 1887-92 he was M.P. for Cambridge University. He died in 1903. His Mathematical and Physical Papers were collected in 1883-84 in three vols., and his Burnett lectures on light were published in 1887.

Stoke-upon-Trent, a municipal and parliamentary borough of England, in Staffordshire, on the Trent and Mersey Canal, 14 miles north-west of Stafford. It has recently been greatly improved, and has now a town-hall, free library and museum, market hall, &c. Its extensive manufactures of china and earthenware make it the centre of the 'Potteries' district. The borough sends one member to parliament. Pop. of mun. bor., 30,458; parl. bor., 89,015.

Stola, a garment worn by the Roman women over the tunic. It came as low as the ankles or feet, was fastened round the

body by a girdle, leaving broad folds above the breast, and had a flounce sewed to the bottom. It was the characteristic dress of the Roman matrons, as the toga was of the men.

Stolberg, a town in Rhenish Prussia, on the Vicht, 7 miles east of Aix-la-Chapelle. Mining for coal, iron, lead, zinc, &c., is extensively carried on in the neighbourhood, and there are smelting works, iron-foundries, rolling-mills, &c. Pop. 14,249.



Roman Matron attired in the Stola.

Stolberg, CHRISTIAN, COUNT VON, German author, born at Hamburg 1748, died 1821. He travelled through Switzerland and North Italy in company with Goethe and Lavater; settled in Schleswig, and wrote poems, dramas, &c., besides a translation of Sophocles and other works from the Greek. He was much influenced by Klopstock.—His brother, FRIEDRICH LEOPOLD, COUNT VON STOLBERG, born 1750, died 1819, wrote plays, poems, travels, &c.; translated the Iliad, four tragedies of Æschylus, some of the works of Plato, and Ossian's works. In 1800 he joined the R. Cath. Church, after which he wrote an elaborate History of the Religion of Jesus Christ.

Stole, a long narrow band or scarf with fringed ends, worn by ecclesiastics of the Roman and English churches, by deacons over the left shoulder, being fastened under the right arm; by bishops round the neck, with both ends pendent in front to the knees; and by priests similarly, but with the ends crossed over the breast at mass.—*Groom of the stole*, the first lord of the bed-chamber in the household of the English kings.

Stolp, a town in Pomerania, Prussia, on the Stolpe, about 10 miles from the Baltic Sea. It has a large church built in the 14th century, an ancient castle, and manufactures of linen, articles in amber, spirits, tobacco, &c. Pop. 31,000.

Stomach, THE, the principal organ of digestion in animals, may be regarded simply as an expanded portion of the alimentary

canal. The human stomach is of an irregularly conical or pear-shaped form; it is situated in the epigastric region, lying almost transversely across the upper and left portion of the abdominal cavity, below the liver and midriff and close to the front wall of the abdomen. Its largest extremity is directed to the left, its smaller to the right. Its upper opening, where the œsophagus terminates, is called the *cardiac* orifice, because of its closeness to the heart; and the lower opening, where the intestine begins, the *pylorus*, the portion of the intestine which joins it here being the duodenum. At the entrance to the latter is a valve which prevents the contents of the intestine from regurgitating backwards. The stomach is composed of four coats or layers, the outermost, or serous layer, forming part of the peritoneum or general lining membrane of the abdomen. Next is a muscular coat, then an intermediate or cellular, and lastly, an inner or mucous coat in which are the orifices of the glands for the secretion of the gastric juice. By its blood-vessels the stomach is intimately connected with the liver and spleen. Its nerves are very numerous, and come from the eighth pair and the sympathetic nerve. By these it is brought into closer relationship with the heart, lungs, &c. The stomach owes its digestive powers chiefly to the gastric juice, an acid liquid containing a fermentive principle called pepsin that converts albuminous foods into peptones capable of absorption. Digestion is also aided by certain stomachic movements by which the gastric juice is mixed with the food. (See *Digestion*.) The stomach is subject to various diseases. *Acute gastric catarrh*, in which the mucous membrane becomes congested, may be constitutional; but more probably it arises from errors in diet, excess of alcohol, sudden changes of temperature, &c. In *chronic gastric catarrh* the congestion becomes permanent, and the symptoms are such as appear in an aggravated form of dyspepsia. *Ulceration of the stomach* is a disease of middle life, and seems to occur most commonly among women. The ulcer is at first limited to the inner coat of the stomach, but if not healed it will strike more deeply and probably penetrate the walls of the stomach. In a case where the stomach adheres, at the seat of the ulcer, to some other organ, actual perforation may be prevented; in which case peritonitis, which is speedily fatal, is not likely to arise. The symptoms of this

disease are chiefly pain, vomiting, especially vomiting of blood, and general dyspeptic symptoms. *Cancer of the stomach* is not uncommon, though it seldom occurs before the age of forty. Its symptoms are not easily to be decided even by a skilful physician. In mammals there are three kinds of stomachs, *simple*, *complex*, and *compound*. In the *simple* it consists of a single cavity, as in man and the Carnivora, &c. This is the most common form. The *complex* has two or more compartments communicating with each other, with no marked difference of structure, as in the kangaroo, squirrel, porcupine, &c. The Cetacea have from five to seven such compartments. The *compound* stomach is peculiar to the ruminants (which see). In animals of the lowest type there is no distinct stomach cavity at all; and even in those more highly organized it is often extremely simple.

Stomach-pump, a small pump or syringe used in medical practice, for the purpose of emptying the stomach and introducing cleansing or other liquids. It resembles the common syringe, except that it has two apertures near the end, instead of one, in which the valves open different ways, so as to constitute a *sucking* and a *forcing* passage. When the object is to extract from the stomach, the pump is worked while its sucking orifice is in connection with a flexible tube passed into the stomach; and the extracted matter escapes by the forcing orifice. When it is desired, on the contrary, to throw cleansing water or other liquid into the stomach, the tube is connected with the forcing orifice, by which the action of the pump is reversed.

Stomach-staggers, a disease in horses, depending on a paralytic affection of the stomach. In this disease the animal dozes in the stable and rests his head in the manger; he then wakes up and falls to eating, which he continues to do till the stomach swells to an enormous extent, and the animal at last dies of apoplexy or his stomach bursts.

Stomap'oda, an order of crustaceans, having six to eight pairs of legs, mostly near the mouth (hence the name). They are found chiefly in intertropical climates, and are almost without exception marine. The order includes the locust shrimps (*Squilla*), the glass shrimps (*Erichthys*), and the opossum shrimps (*Mysis*).

Stom'ata, in botany, minute orifices or pores in the epidermis of leaves, &c., which

open directly into the air cavities pervading the parenchyma, and through which exhalation takes place. In zoology the name is given to the breathing-holes of insects or similar animals. They are situated along the sides of the body in insects.

Stone, a town of England, county of Stafford, on the Trent, 7 miles south of Stoke-upon-Trent. It manufactures earthenware, shoes, &c. Pop. 5680.

Stone, a common measure of weight. The English imperial standard stone is 14 lbs. avoirdupois, but other values are in regular use, varying with the article weighed; thus, the stone of butcher's meat or fish is 8 lbs., of cheese 16 lbs., of hemp 32 lbs., of glass 5 lbs.

Stone, or CALCULUS. See *Calculus*.

Stone, BUILDING. A good building stone must be durable, that is, able to resist 'weathering' well. Durability is to some extent conditioned by climate and situation, but in the main it depends upon the chemical composition and the structure of the stone. In a wet climate, or in an atmosphere charged with excess of carbonic acid or with other gases given off from large manufacturing and industrial works, no stone will last as long as in a dry climate or in a purer atmosphere. A compact, non-porous, crystalline stone is the best for outside work. The presence of iron, at least in large quantity, is objectionable, because it readily oxidizes, thus producing decay and spoiling the appearance of the building. Stone used in building must also be easily worked into the forms required, and it should be placed on its natural bed to secure the greatest stability and durability. For some purposes hardness is an essential quality, but the hardest stones do not always resist weather best. The principal building stones are sandstones and limestones, with granites, slates, and serpentines as important secondary kinds. Sandstones are found of many colours, white, yellow, gray, brown, red, &c., the colour being determined by the form in which iron appears in the stone. Those kinds which do not readily divide into thin layers and are easily worked by the chisel are called freestones, a name also applied to similar limestones. Among notable varieties of limestone used in building are marble, in Britain confined to ornamental inside work; Portland stone, a granular limestone of which many leading buildings in London are constructed; dolomite or magnesian limestone, used in the

Houses of Parliament; Bath and Caen stone, used for fine interior work. Granite is generally used in Britain only for ornamental parts of buildings, but in some places where it is abundant, notably Aberdeen, it is the main building material. The term granite as used by builders includes syenite and syenitic granite. Slate is the best roofing stone, but some thicker varieties, called slate slabs, are used for cisterns, sills, &c. Serpentine, sometimes misnamed marble, is used for ornamental interior work. See the articles on these stones.

The preservation of stone from decay is an important question in large cities. Painting the stone with ordinary paint, oil, or paraffin does not protect it for long, and is apt to spoil its appearance. More useful processes consist in the formation of insoluble silicates on the surface of the stone, but efflorescence may result, with consequent disfigurement of the building. Kuhlmann's process consists in coating with a solution of silicate of potash or silicate of soda. In Ransome's process the stone is first saturated with a silicate of soda or potash, and a solution of calcium chloride then applied. The result is the formation of insoluble calcium silicate on the surface, thus giving greater hardness and durability to the stone. Other silicate paints have been used with more or less success.

Various kinds of *artificial stone* (other than brick and terra-cotta) have come into fairly extensive use in recent years. Ransome's artificial stone is prepared from dried sand, silicate of soda, and calcium chloride. The first two are intimately mixed with some powdered stone or chalk, and the mixture is forced into moulds. A cold solution of the chloride is poured over the blocks so formed, and they are next immersed in a boiling solution of the same substance. The finished stone is equal to the best natural building stone in weathering qualities, and is very easily worked. Victoria stone is made by mixing finely-powdered granite with Portland cement, allowing the mixture to set into the required shape, and then immersing the block in silicate of soda. It is chiefly used for paving.

Stone, FRANK, English genre painter, born at Manchester 1800, died at London 1859. He painted at first in water-colours, and was for long a member of the old Water-colour Society. His first important work in oil, the *Legend of Montrose*, was

exhibited at the Academy in 1840. Among his subsequent works are: *The First Appeal*, *The Last Appeal*, *Mated*, *The Course of True Love*, *The Gardener's Daughter*. Most of his works have been engraved. He was elected A.R.A. in 1851.

Stone, MARCUS, R.A., a painter of historical genre, the son of Frank Stone, A.R.A., was born in London in 1840; learned his art in his father's studio; exhibited his first picture in 1858 in the Academy, of which he became an associate in 1877, being elected an Academician in 1887. Among his better-known pictures are: *Claudio accuses Hero* (1861); *On the Road from Waterloo to Paris* (1862); *Stealing the Keys* (1866); *Henry VIII. and Anne Boleyn* (1870); *Sain et Sauf* (1875); *Il y en a toujours un Autre* (1882); *A Gambler's Wife* (1885); and *The First Love Letter* (1889).

Stone Age, the name applied in archaeology to that stage of human development during which stone is the material used for making implements or articles which among more advanced peoples are made of metals. The term does not imply a period for which a definite date need be given. Some peoples are still in the stone age of their civilization, or are only emerging from it, but in Europe the transition from stone to bronze, which preceded iron as the chief metal, was effected about 1000 or 1500 B.C. How far it extended backwards no one can say. The Stone Age is divided by archaeologists into two great periods, the Palæolithic and the Neolithic. Palæolithic stone implements are very rude and unpolished, and are always of flint, but those of the Neolithic period are neatly finished, often finely polished, and of other kinds of stone besides flint. Palæolithic remains are found in river-gravels and caves in various parts of Europe, the river-gravel implements being the more primitive. These palæolithic implements are found in association with the remains of wholly or locally extinct animals, such as the mammoth, the woolly rhinoceros, the cave-bear, the hyæna, the reindeer, and the musk-ox, but the animals of the Neolithic time were practically the same as those of to-day. Neolithic remains are found in ancient rubbish-heaps, chambered tombs, &c. See *Archæology*, *Kitchen-middens*, *Lake-dwellings*, &c.

Stone-chat, an insectorial bird of the family of warblers (*Saxicôla rubicôlla*). The stone-chat is common in Europe, and fre-

quents moors and other open wastes. Its colour on the upper part generally is black, the belly is yellowish-white, and the breast a light chestnut brown. It runs with much celerity, and its food consists of insects and worms.

Stone Circles, ancient monuments of unknown origin and date. They consist of upright pillars ('monoliths') of unhewn stone set round a more or less circular area. They are very common in the British Islands, especially in Scotland, and excavation has proved that most of them were used as burial-places in the Bronze Age. The greatest stone circles in England are Stonehenge and Avebury, and the chief Scottish one is at Stennis in Orkney.

Stone Coal, a name of anthracite (which see).

Stonecrop. See *Sedum*.

Stone-curllew. See *Stone-plover*.

Stonefield, a town of Scotland, in Lanarkshire, in a colliery district, near Blantyre, 2 miles N.W. of Hamilton. Pop. 7288.

Stone-fly (*Perla bicaudata*), a well-known species of neuropterous insects, much used by anglers as a bait in trout-fishing. The hinder wings are large, the abdomen is furnished with two long appendages, and the larger jaws or mandibles are rudimentary. These flies and their larvæ occur plentifully in the neighbourhood of lakes and ponds.

Stone-fruit, a popular name for any drupaceous fruit. See *Drupe*.

Stoneham, a town of the United States, in Massachusetts, 10 miles north of Boston, with manufactures of leather, boots, and shoes. Pop. 6197.

Stonehaven, a seaport and seaside resort of Scotland, county town of Kincardine, 15 miles south-west of Aberdeen, on a bay at the mouths of the small rivers Carron and Cowie. It consists of an old town on the right, and a new town (partly consisting of villa residences) on the left bank of the Carron. There is a large tanwork, and the herring and other fisheries are important. Pop. 4577.

Stonehenge, an extensive group of standing stones in Salisbury Plain, Wiltshire, England, about 7 miles north of Salisbury. They form two circles and two ovals. The outer circle, which is about 300 feet in circumference, consisted, when entire, of sixty stones, each being about 15 feet high and 7 feet broad. Of these thirty were uprights, others were imposts, the uprights being placed at intervals of $3\frac{1}{2}$ feet, and the imposts fit-

ting by means of tenon and mortice. Of the outer circle twenty-four uprights remain (seventeen standing and seven down) and eight imposts, and at the grand entrance there are eleven uprights remaining, with five imposts. The inner circle, which is 8 feet from the outer, consisted of about thirty stones, 6 feet in height, without imposts; nineteen remain, eleven standing. The first oval consists of five trilithons, as they are called, that is, groups of three stones, two uprights, with an impost. Before each trilithon stood three smaller upright stones, but there are only six now standing. Inside the inner oval is a large slab supposed to have been an altar. The whole is surrounded by a double mound and ditch, and there is also an avenue leading from the north-east, bounded by a mound and ditch. In the surrounding plain are numerous tumuli. These circles were probably formed in connection with some old religion, and may date from the bronze age; but nothing is known of their origin or date, and excavation has done little to dispel our ignorance. See *Stone Circles*, *Standing Stones*.

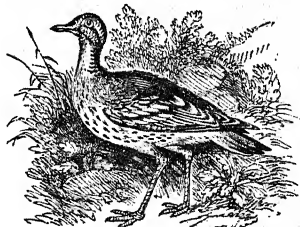
Stonehouse, or **EAST STONEHOUSE**, a suburb of Plymouth, on its west side, and lying between the latter and Devonport. It has extensive barracks, the Royal Naval Hospital, and the Victualling Office. Pop. 15,111. See *Plymouth*.

Stone-lily, a popular name of the encrinites.

Stone-ochre, an earthy oxide of iron which forms a yellow pigment of considerable permanence in oil or water colours.

Stone-pine, a tree of the genus *Pinus*, the *P. Pinea*, common in the south of Italy. See *Pine*.

Stone-plover, a large species of plover, the *Edicnemus crepitans*. It appears in



Stone-plover (*Edicnemus crepitans*).

England at the latter end of April, frequents open hilly situations; makes no nest, but lays two eggs on the bare ground, and

emigrates in small flocks about the end of September. Called also *stone-curlew* and *thick-knee*.

Stones, PRECIOUS. See *Gems*.

Stonesfield Slate, in geology, a slaty calcareous limestone, forming a constituent portion of the lower oolite formation, and abounding in organic remains. In it was first detected mammalian remains of the secondary epoch. See *Geology*.

Stoneware. See *Pottery*.

Ston'nington, a town and port of the U. States, in Connecticut; with manufactures of textiles and machinery. Pop. 8540.

Sto'nyhurst College, an English Roman Catholic educational institution 10 miles north of Blackburn, Lancashire, conducted by Jesuit fathers. It has a good observatory and an excellent library, including some bibliographical rarities. There are about 300 students.

Stool of Repentance. See *Cutty-stool*.

Stoppage in Transitu is the exercise of a right allowed by law to a seller to stop the delivery of goods purchased by a buyer who has become bankrupt while the goods are in the hands of a carrier or middle-man for transmission. Stoppage in transitu, as the term implies, can only take place while the goods are actually on the way, since if they have arrived at their journey's end the seller's right over them has ceased.

Storax, a resinous and odoriferous balsam. It is obtained by incisions made in the branches of the *Styrax officinalis*, a small tree which grows in the Levant, and is also known by the name of storax. The best is imported in red tears, but the common sort in large cakes. Storax has an agreeable, slightly pungent, and aromatic taste; it is stimulant, and in some degree expectorant. — *Liquid storax* is obtained from *Liquidambar styraciflua*, a tree which grows in Virginia, and other species. It is greenish, of an agreeable taste and aromatic smell.

Stork, a name given to the birds of the genus *Ciconia* and of the sub-family Ciconinæ. They are tall and stately birds, the beak being moderately cleft and destitute of a nasal furrow. The common stork (*Ciconia alba*) is found throughout the greater part of Europe (being a very rare visitant of Britain), but passes the winter in Africa and Asia. The adult is pure white, with the exception of the black quill feathers of the wings, the scapularies, and greater wing-coverts, and the red beak, legs, and toes. It is about 3 feet 6 inches in

length, and when erect its head is about 4 feet from the ground. It is remarkable for its affection towards its young. The black stork (*C. nigra*) occurs in Poland and Prussia, and in the sequestered parts of the Alps. The American stork is the *C. Maguari*; and the gigantic stork, or adjutant of Bengal, is the *C. argala*.

Storm. See *Meteorology*, *Cyclone*, *Wind*.

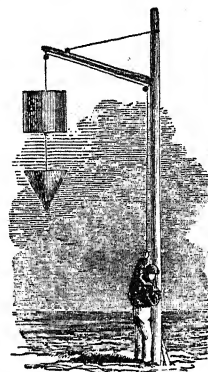
Storm-glass, a weather-glass consisting of a tube containing a chemical solution sensible to atmospheric changes. In fine weather the substances in solution are said to settle at the bottom of the tube, leaving the liquid comparatively clear; previous to a storm the substances rise, and the liquid assumes a turbid and flocculent appearance.

Storm-signal, a cone and drum used at seaports and coast-guard stations to indicate the approach of a storm. The cone exhibited alone with its apex down portends a south gale; with its apex up a north gale. The cone with the apex down and the drum over it portends dangerous winds from the south; with the apex up and the drum under dangerous winds from the north.

Stornoway, a police burgh and seaport on the island of Lewis, Ross-shire, Scotland, about 180 miles from Oban. It is the centre of fishing industry in the Outer Hebrides, its export of fish being chiefly to the Baltic ports. Pop. 3852.

Storthing, the parliament or supreme legislative assembly of Norway (which see).

Story, JOSEPH, LL.D., American lawyer, born 1779, died 1845. In 1808 he entered congress, in 1810 became speaker of the Massachusetts state legislature, and soon after was appointed a judge of the U.S. Supreme Court. In 1829 he became professor of law at Harvard, a position which he held for the rest of his life. His law works include a number of special treatises, commentaries, and judgments, and a collection of his miscellaneous writings was



Storm-signal, indicating dangerous winds from the south.

published in 1852.—His son, WILLIAM WETMORE STORY, born 1819 in Salem, Mass., studied law, and published several law-books, but gave up the legal profession. He resided long in Rome, and was both a sculptor and a poet. He died in 1895.

Stothard (stō'thård), THOMAS, English painter, born in London 1755, died 1834. Having shown an aptitude for drawing he was bound apprentice to a drawer of patterns for brocaded silks, and soon attempted book illustration in his leisure hours. He afterwards drew designs for the *Town and Country Magazine*, *Bell's British Poets*, and the *Novelist's Magazine*. He also became a student at the Royal Academy, exhibited a picture there in 1778, was elected an associate in 1791, and in 1794 an academician. Among his works, which number over 5000 designs, the more important series and single designs are for *Boydell's Shakspeare*, illustrations of *Robinson Crusoe*, *The Pilgrim's Progress* (1788), *The Rape of the Lock* (1798), *Cowper's Poems* (1825), *Rogers' Italy* (1830), and *Poems* (1834); while his best-known works are *The Canterbury Pilgrims*, *The Flicht of Bacon*, *Greek Vintage*, *Fête Champêtre*, *Sancho and the Duchess*, &c.—His son, CHARLES ALFRED STOTHARD, born in London 1786, killed by accidentally falling from a ladder, 1821, was well known as an antiquarian, draughtsman, painter, and illuminator.

Stourbridge (stur'brij'), a market town of England, in Worcestershire, 10 miles w. of Birmingham. It has extensive manufactures of glass, iron, and fire-bricks. Pop. 16,302.

Stourbridge Clay, a celebrated fire-clay found in a bed four feet thick, in the coal-measures of Stourbridge in Worcestershire.

Stove, an apparatus of metal, brick, or earthenware, which is heated within by a fire, generally almost excluded from sight. The heating medium may be burning wood, coal, petroleum, or gas. The simplest of all forms is the familiar Dutch stove, a hollow cylinder of iron, standing on the floor, close at top, whence a small flue or chimney proceeds, with bottom bars on which the coals, &c., rest. But as this form was found objectionable from the metal becoming overheated and the air in the apartment becoming unwholesomely dry, many kinds of improved stoves have now taken its place.

Stow, JOHN, an English historian and antiquary, born about 1525 in London, died 1605. He learned his father's business,

who was a tailor, but his bent was towards antiquarian research. His studies and the books in his possession brought him under the suspicion of the ecclesiastical authority, but the attempts to incriminate him as a papist failed. The chief publications of Stow were, *A Summary of Englische Chronicles* (1561); *Annales, or a Generale Chronicle of England from Brute until the present Yeare of Christe* (1580); and *A Survey of London* (1598). He also printed the *Flores Historiarum* of Matthew of Westminster (1567), the *Chronicle of Matthew of Paris* (1571), and the *Historia Brevis* of Thomas Walsingham (1574).

Stowe (stō), MRS. HARRIET ELIZABETH, daughter of the Rev. Lyman Beecher and sister to Rev. Henry Ward Beecher, was born at Litchfield, Connecticut, in 1812; became associated with her sister Catherine in teaching a school at Hartford; removed to Cincinnati, and there married the Rev. Calvin E. Stowe in 1836; wrote several tales and sketches, and contributed to the *National Era*, a newspaper published at Washington, the serial story of *Uncle Tom's Cabin*; issued this tale in book-form in 1852, when it achieved an enormous success both in the United States and Europe. Among her other numerous writings are: *Sunny Memories of Foreign Lands* (1854); *Dred*, a Tale of the Dismal Swamp (1859); *The Minister's Wooing* (1859); and *Lady Byron Vindicated* (1870). She died in 1896.

Stow-market, a town in England, county of Suffolk, 12 miles N.N.W. of Ipswich, on the Gipping. There are manufactures of gun-cotton, carriages, malt, &c., and an extensive trade. Pop. 4162.

Strabane (strā-bān'), a market-town in Ireland, county of Tyrone, on the Mourne, near its confluence with the Finn, 15 miles S.W. of Londonderry. Shirt-making is the chief industry. Pop. 5033.

Strabismus. See *Squinting*.

Strabo, Greek geographer, a native of Amasia, in Pontus, was born about 54 B.C., and died about 21 A.D. His earliest writings were his *Historical Memoirs* and a *Continuation of Polybius*, both of which are now lost. His great work, however, on geography, in seventeen books, has been preserved entire, with the exception of the seventh book, of which there is only an epitome. The first two books are introductory, the next ten treat of Europe, the four following of Asia, and the last of Africa.

Stradella, ALESSANDRO, born at Naples about 1645, was chapel-master at Genoa, and composed oratorios, cantatas, madrigals, and operas. At Venice he became enamoured of one of his pupils named Ortesia, the mistress of a Venetian noble, who eloped with him to Rome. They were followed, and three several attempts made by hired assassins to murder them. This was ultimately accomplished (1678) in Genoa. This tragical story forms the subject of an opera by Flotow.

Stradivari, ANTONIO (STRADIVARIUS), a celebrated violin-maker, who was born in Cremona, Italy, about 1649; died 1737. He was a pupil of Nicolo Amati, in whose employment he remained until 1700, when he began making on his own account. It was he who settled the typical pattern of the Cremona violin, and his instruments, for tone and finish, have never yet been excelled.

Strafford, THOMAS WENTWORTH, EARL OF, an English statesman, the eldest son of Sir William Wentworth, was born in London in 1593, educated at St. John's College, Cambridge, and after leaving the university received the honour of knighthood. He sat in parliament for Yorkshire for a number of years, and when Charles I. asserted that the Commons enjoyed no rights but by royal permission, he was strongly opposed by Sir Thomas Wentworth. In this struggle his abilities were recognized, and high terms offered him by the court, which he accepted, and in 1628 was successively created Baron Wentworth, privy-councillor, and President of the North. In the exercise of this authority he commended himself to Archbishop Laud, who selected him to proceed to Ireland as lord-deputy in 1632. Here he greatly improved the state of the country, alike as regarded law, revenue, and trade; but to accomplish his ends he did not scruple to use the strongest and most arbitrary measures. For these services he was created Earl of Strafford. When the Long Parliament met the very first movement of the party opposed to arbitrary power was to impeach Strafford of high treason, with which charge Pym appeared at the bar of the House of Lords in 1640. His defence, however, was so strong that the original impeachment was deserted for a bill of attainder. The bill passed the Commons by a great majority, and was feebly supported by the House of Lords. The king endeavoured to secure his safety, but yielded to the advice of his counsellors, backed by a

letter from Strafford himself, who urged him, for his own safety, to ratify the bill. Strafford was accordingly beheaded on Tower Hill in May 1641.

Strain, in mechanics, the force which acts on any material, and which tends to disarrange its component parts or destroy their cohesion, or the change resulting from application of such force. See *Stress, Elasticity, Strength of Materials*.

Straits Settlements, a British crown colony, deriving its name from the straits which separate the Malay Peninsula from Sumatra. It consists of the island of Singapore (the seat of government); town and province of Malacca; island of Penang and province of Wellesley; islands and territory of the Dindings; the Cocos Islands, Labuan, and Christmas Island as dependencies; and it has an administrative control of the native states of Perak, Selangor, Sungei Ujong, Negri Sembilan, Johore, and Pahang; area, about 37,000 square miles. The colony is under a governor and an executive and a legislative council. The exports (chiefly tin, spices, gums, gambier, tapioca, sago, copra, and rattans) amount annually to about £30,000,000, and the imports to £35,000,000. The annual revenue and expenditure both somewhat exceed £1,000,000. Pop. 572,249; Federated Malay States, 678,595. See *Singapore, Malacca, &c.*

Stralsund (sträl'zunt), a seaport town of Prussia, in Pomerania, on the strait which separates the island of Rügen from the mainland, 115 miles north by west of Berlin. Its chief buildings are three massive Gothic churches and an ancient town-house. The manufactures consist of iron castings, machinery, sugar, &c., and there is a trade in grain and timber. Pop. 81,076.

Stramonium. See *Datura*.

Strange, SIR ROBERT, an eminent engraver, was born in Pomona, one of the Orkney Isles, in 1721, and died 1792. He studied law and attempted a seafaring life, but ultimately resolved to devote himself to painting. While thus engaged the rebellion of 1745 broke out, and he joined the Highland forces in Edinburgh, where he engraved a half-length portrait of the Pretender. After the battle of Culloden he went to France, gained a prize for design at Rouen, resided for some time at Paris, and in 1751 settled in London and became the founder of the English school of historical engraving. He received knighthood in 1787. His engraved plates, which number about eighty,

evince an unusual combination of purity, breadth, and vigour.

Strangles, in farriery, a disorder which attacks horses, and generally between the ages of three and five years. It consists of an abscess which occurs between the branches of the lower jaw. The disease is considered contagious. There is a similar infectious disease of swine called also *strangles*.

Strangulation, a sudden and violent compression of the windpipe, constriction being applied directly to the neck, either around it (as in hanging) or in the forepart, so as to prevent the passage of air, and thereby suspend respiration and life. If animation is only suspended by strangulation, the methods of restoring it are much the same as in drowning (which see).

Strangury, a disease in which there is pain in passing the urine, which is excreted with difficulty.

Stranraer (*stran-rar'*), a royal and municipal burgh and seaport, Scotland, county of Wigton, at the head of Loch Ryan, 20 miles west of Wigton. The principal buildings are the ruins of Kennedy Castle, which stand in the centre of the town, and the town-hall and court-house. The chief trade is in agricultural produce, and there is a daily service of steamers to Ireland in connection with the railway. Until 1885 Stranraer was one of the Wigton parliamentary burghs. Pop. 6036.

Strappa'do, a military punishment, which consisted in having the hands of the offender tied behind his back, drawing him up by them to a certain elevation by a rope, and then suddenly letting him drop to within a certain distance of the ground.

Strap-work, a style of architectural ornamentation or enrichment general in the 15th and 16th centuries, but of which specimens exist executed as far back as the 11th century, consisting of a narrow fillet or band folded and crossed, and occasionally interlaced with another.

Stras'burg, or STRASSBURG, a town and fortress of Germany, in Alsace, capital of the territory of Alsace-Lorraine, on the Ill, about 2 miles west of the Rhine, to which its glaciis extends, 250 miles east by south of Paris, and about 370 miles south-west of Berlin. By means of canals which unite the Ill with the Rhine, Rhone, and Marne, it is brought into communication with the Atlantic and the Mediterranean. It has always been regarded as a place of strate-

gical importance, and strong fortifications and a pentagonal citadel were erected by Vauban in 1682-84. Since the siege of 1870 by the Germans these have been considerably altered and strengthened, the new system of defence adopted including fourteen detached forts situated from three to five miles from the centre of the town. The streets in the older parts are irregular and quaint of aspect, but since the removal of part of the old fortifications the modern portions have greatly expanded. The chief building is the cathedral, a structure which presents the architectural styles of the centuries from the 11th to the 15th, in which it was built, but whose main element is Gothic. It is surmounted by a tower 466 feet high, has a splendid western façade, with statues and great rose-window, fine painted glass windows, and a famous astronomical clock. Other notable buildings are the church of St. Thomas, the Neue Kirche, the old town-house (now Hôtel du Commerce), the old episcopal palace (now a municipal museum), the town-house, the university buildings, and the imperial palace. The library of the university and province contains about 700,000 volumes. There are statues to Gutenberg and General Kléber, in squares correspondingly named, besides others. Its industries include tobacco, tanning, brewing, machinery, woollen and cotton goods, cutlery, musical instruments, artificial flowers, gloves, chemicals, and the preparation of its celebrated *pâtés de foie gras*. Strasburg, under the name of Argenteratum, is supposed to have been founded by the Romans, who erected it as a barrier against the incursions of the Germans, who ultimately possessed it. In the 6th century the name was changed to Strasburg, and in the beginning of the 10th century it became subject to the emperors of Germany. United to France in 1681, it was ceded with the territories of Alsace and Lorraine to Germany in 1871. Pop. 167,678.

Strass, a variety of flint-glass, but containing more lead, and, in some cases, a smaller proportion of borax, used in the manufacture of artificial gems of the better class.

Strategy may be defined as the art of moving troops so as to be enabled either to dispense with a battle, or to deliver one with the greatest advantage and with the most decisive results. *Tactics* is the art of handling troops when in actual contact with the enemy.

Stratford, a town of England, county of Essex, in the eastern suburbs of London, in bor. of West Ham. It has extensive engineering works in connection with the Great Eastern Railway, chemical works, distilleries, &c. Pop. 44,827.

Stratford de Redcliffe. See *Canning, Stratford*.

Stratford-upon-Avon, a municipal borough and market-town of England in Warwickshire, 8 miles south-west of Warwick, and about 100 miles by rail from London, famous as the birthplace of Shakspeare. The chief objects of interest are the house in which Shakspeare was born, and the parish church in which he was buried. This church is an ancient edifice, in the form of a cross, with a square embattled tower terminating in a lofty octagonal spire. The interior was restored in 1840, and the tower rebuilt with the old material in 1867. Shakspeare's remains were interred in the chancel, and against the north wall are his monument and bust. There are several other churches, a town-hall, guild-hall, Shakspeare memorial theatre, library, and picture-gallery. Pop. 8310.

Strath, in Scotland, a valley of considerable size, often having a river running through it and giving it its distinctive appellation; as *Strathspey, Strathdon, Strathcarn, Strathmore*, &c.

Strathaven, a town and burgh of barony in Scotland, county of Lanark, 16 miles s.s.e. of Glasgow. The chief industry is weaving. Pop. 4076.

Strathclyde, a kingdom formed by the Northern Romanized Britons which extended from the Clyde to the Solway, and had its capital in Dumbarton. See *Cumbria, Scotland*.

Strathmore' is the general name given to the extensive valley of Scotland which stretches north-east from Dumbartonshire to Kincardineshire, having on one side the Grampians and on the other the Campsie, Ochil, and Sidlaw Hills; but it is popularly limited to the district which stretches from Methven in Perthshire to Brechin in Forfarshire.

Strathnairn, HUGH HENRY ROSE, BARON, soldier, born 1801, died 1885. He entered the army in 1820, organized the Turkish defence in 1840, was consul-general for Syria, and in 1848 became secretary to Lord Stratford de Redcliffe. He served in the Crimean war and the suppression of the Indian mutiny, succeeded Lord Clyde as commander-in-chief in India, and from

1865-70 was commander-in-chief in Ireland. He was raised to the peerage in 1866 and made field-marshal in 1877.

Strathspey, in Scotland, a species of dance in duple time, supposed to have been first practised in the district from which it received its name. It resembles the reel, but has a slower movement.

Stratum, in geology, a layer of any deposited substance, as sand, clay, limestone, &c., which has been originally spread out over a certain surface by the action of water, or in some cases by wind, especially such a layer when forming one of a number superposed and forming a mass of rock. When strata do not lie horizontally but are inclined, they are said to *dip* towards some point of the compass, and the angle they make with the horizon is called the *angle of dip* or inclination. When strata protrude above the surface, or appear uncovered, they are said to *crop out*. They are said to be *conformable* when their planes are parallel, whatever their dip may be; and *unconformable* when there is a want of parallelism between the strata. See *Geology*.

Stratus. See *Cloud*.

Straubing, a town in Lower Bavaria, on a height above the right bank of the Danube, 25 miles south-east of Ratisbon. Pop. 20,500.

Strauss (strous), DAVID FRIEDRICH, was born at Ludwigsburg, Württemberg, in 1808, and died 1874. He studied in Tübingen University; became assistant to a country clergyman in 1830; was appointed temporary professor in the seminary at Maulbronn; resigned this position and went to Berlin in 1831 to study under Schleiermacher and Hegel; returned to Tübingen and lectured on logic and philosophy; and published in 1835 his famous *Life of Jesus*, in which he attempted to prove that the gospel narratives had a mythical origin and growth. To his numerous critics he replied in *Streitschriften*, and *Zwei friedliche Blätter*. Appointed in 1839 to the chair of dogmatic theology in Zürich he was prevented from entering upon his duties by a storm of popular indignation, but received a small pension in recompense. His subsequent writings were: *Christliche Glaubenslehre* (1839-41); *Life of Schubert* (1849); *Life of Christian Märklin* (1851); *Life of Ulrich von Hutten* (1858-60); *Leben Jesu für das Deutsche Volk* (*Life of Jesus for the German People*; 1877); *Der Christus des Glaubens und der Jesus der Geschichte*

(The Christ of Faith and the Jesus of History; 1865); and *Der alte und der neue Glaube* (The Old and the New Faith; 1872), in which he defines his final attitude to Christianity, that being now entirely hostile. His more important works have been translated into English.

Strauss, JOHANN, German composer, born 1825; son of Johann Strauss, a Viennese dance-music writer and conductor (1805–49). He toured through Europe, and was long at the head of a famous orchestra in Vienna. He wrote over 400 waltzes, many of them world-famous, and was the author of several operettas. He died in 1899. —His brothers **JOSEPH** (born 1827, died 1870) and **EDWARD** (born 1835) have also distinguished themselves as composers and conductors.

Strawberry, a well-known fruit and plant of the genus *Fragaria*, natural order Rosaceae. It is remarkable for the manner in which the receptacle, commonly called the fruit, increases and becomes succulent; but the true fruit is the small seeds or achenes on the surface of the receptacle. The species are perennial plants throwing out runners which take root and produce new plants; they are natives of temperate and cold climates in Europe, America, and Asia. The following species afford the varieties of cultivated strawberries: (1) Wood strawberry (*F. vesca*), found wild in woods and on hillsides throughout Europe, and now cultivated in gardens, as the red, the white, the American, and Danish Alpine strawberries. (2) The Alpine strawberry (*F. collina*), a native of Switzerland and Germany. The varieties of strawberries called green are the produce of this species. (3) Hautbois strawberry (*F. elatior*), a native of North America. (4) Virginian strawberry (*F. virginiana* or *caroliniana*), a native of Virginia. To this species belongs a great list of sorts cultivated in gardens, and known by the name of scarlet and black strawberries. (5) Large-flowered strawberry (*F. grandiflora*) is supposed to be a native of Surinam, and to have furnished our gardens with the sorts called pine strawberries. (6) Chili strawberry (*F. chilensis*), a native of Chili and Peru, and the parent of a number of mostly inferior strawberries. Strawberries are much valued for dessert, and for purposes of jam-making. The strawberry thrives in any good garden soil, and is propagated by seeds, by division of the plant, and by runners.

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Strawberry-pear, a plant of the cactus family, the *Cereus triangularis*, which grows



Strawberry-pear (*Cereus triangularis*).

in the West India Islands. Its fruit is sweetish, slightly acid, pleasant, and cooling.

Strawberry-tomato, the name of a plant of the genus *Physalis* (*P. Alkekengi*), nat. order Solanaceae, known also as *winter-cherry*, cultivated for its fruit, which is of a bright red colour, of the size of a small cherry, and makes a delicate sweetmeat.

Straw Plait, straw plaited or braided into strips or tissues of some size for making hats, bags, ornaments, &c. In the manufacture of straw hats the straw must be of a certain length between the knots and must not be brittle; and these qualities are found most frequently in the wheat grown in Tuscany, where the well-known Leghorn hats are made. When the grain is still green the straw is pulled up by the roots, dried in the sun, bleached by means of sulphureous fumes, split by a machine, and then plaited into hats by women and young children as a domestic industry. Certain kinds of wheat cultivated around Luton in Bedfordshire were found suitable for plaiting, from which cause it became the centre of the straw-plait industry in England. Straw plait is now made in various other countries, including Switzerland, Holland, and Belgium. Great quantities of braid are now exported from China, partly to the United States, where the making of hats, &c., from imported plait is now an extensive industry.

Street, GEORGE EDMUND, English architect, born in 1824. Having studied architecture under Sir G. Gilbert Scott, in 1850 he began work on his own account. He

favoured the English Gothic style, and in this his principal works were built. The chief of these were the new law-courts in the Strand, London, for which he was appointed architect in 1868, after competition. He was a member of the British and American Institutes of Architecture, and a Royal Academician (1871). He published *The Brick and Marble Architecture of North Italy in the Middle Ages* (1855), and *Some Account of Gothic Architecture in Spain* (1865). The dioceses of Oxford, York, Ripon, and Winchester had him retained as architect. He died in 1881.

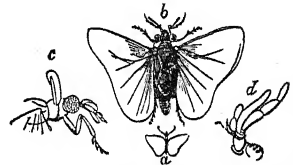
Streets, PAVEMENT OF. See *Pavement*.

Strelitz, the life-guards of the Russian czars, instituted by Ivan the Terrible in the middle of the 16th century. Peter the Great dissolved the corps in 1697 in consequence of an insurrection, put several thousands to death, and banished the rest to Astrakhan. Having been guilty of some disturbances here they were entirely dispersed and destroyed in 1705.

Strength of Materials. The strength of any material is the resistance which it opposes to alteration of form or to fracture by any application of force. Materials are subject to many forms of strains, and some are better qualified to resist strains of a certain kind than others. Stone, for example, is admirably constituted for supporting immense weights, but it would not offer much resistance to a direct pull. Wrought-iron is superior to cast-iron in resisting a pull or tensile stress, but the latter excels the former in its resistance to a thrust or compressive stress. A material is exposed to five distinct strains: a tensile or stretching strain in the direction of its fibres, as in the case of ropes, tie-beams, &c.; a transverse strain acting perpendicularly or obliquely to its length, as in levers, joists, &c.; a crushing strain by pressure, as in the case of pillars, posts, &c.; a torsional or twisting strain acting in a perpendicular direction at the extremity of a lever or otherwise, as in axles, crank-shafts, &c.; and a shearing force applied laterally, as in the case of a shearing-machine for cutting through iron plates and bars. Wrought-iron and steel offer the greatest resistance to tensile strains; the strength of wood in this direction varies according to its seasoning and specific gravity. The heavier the wood is, in general, the stronger it is. The transverse strength of beams is determined largely by their elasticity. This property varies greatly in dif-

ferent materials. Wood has a greater elastic range of action than iron or steel bars, and consequently sinks or deflects to a greater degree under a given weight. Any strain beyond the *elastic limit* entails fracture. Increased stiffness or transverse resistance of beams is rapidly obtained with an increase of depth of the beam. With the exception of wood, materials offer a greater resistance to a crushing force than to a tensile strain. Cast-iron is superior to wrought-iron in this respect, and is consequently much employed in the construction of girders and other supports. Torsional stress tries the solidity and tenacity of metals more than any other kind of stress. But the torsional strength of shafts increases very rapidly as the diameter is enlarged. The distribution of material in hollow forms conduces to the greatest strength and stiffness in combination with the minimum consumption of material. A familiar instance of the hollow construction is the stem of grasses, and especially the bamboo, while another example is that of the hollow bones of animals.

Strepsiptera ('twisted-winged'), a small and very peculiar and anomalous order of insects. The females are wingless, and live as parasites in the abdomens of bees, wasps, and other hymenopterous insects. The males have the front pair of wings in the form of



Strepsiptera.

a, *Stylops Dalii*, male insect. b, Do. magnified.
c, Anterior wings. d, Double antennæ.

twisted filaments, the posterior pair are fan-shaped and membranous. The jaws are rudimentary. The heads of the parasitic females protrude from between the abdominal joints of their host. The strepsiptera are viviparous, and the larvæ are little caterpillars which attach themselves to the bodies of wasps and bees. The female larvæ never leave their hosts; the male larvæ undergo their metamorphosis within the bodies of their hosts, from which in due time they emerge as perfect winged males. *Stylops Dalii* and *S. Spencii* are common species.

Strepsirhina ('twisted-nostrils'), one of the three chief divisions into which the order

Quadrumana or monkeys is sometimes arranged, represented by such forms as the aye-aye or cheiromys of Madagascar, by the lemurs, loris, &c. See *Lemur*, &c.

Stress, in mechanics, a term sometimes used as equivalent to *strain*, at other times used as the force producing strain, the latter referring to the amount of change produced. See *Strain*.

Strickland, AGNES, an English authoress, born 1796 at Reydon Hall, near Southwold, Suffolk. She wrote, in conjunction with her sister Elizabeth, *Lives of the Queens of England* (twelve vols., 1840-48); *Lives of the Queens of Scotland* (eight vols., 1850-59). She also published *Letters of Mary Queen of Scots*, with an *Historical Introduction and Notes*; *Lives of the Bachelor Kings of England*; *Lives of the Tudor Princesses*; poems, stories, &c. She died in 1874.

Stricture, a contraction of a tube, duct, or orifice; for instance, of any part of the alimentary canal or of the urinary passages. This disease usually affects the urethra, and is treated by dieting and dilatation of the passage by means of catheters.

Striegau (stré'gou), a town of Prussia, prov. of Silesia, 27 miles w.s.w. of Breslau. It has granite quarries and polishing works. On 4th June, 1745, the Austrians and Saxons were defeated here by Frederick the Great. Pop. 12,853.

Strigidae (strij'i-dé), a family of nocturnal birds of prey, comprehending the owls.

Strigops. See *Owl-parrot*.

Strike, the action taken by workmen in any branch of industry, when they cease from work with the object of compelling their employer to concede certain demands made by them; distinguished from a *lock-out*, which is the retaliatory measure adopted by the employers to resist such demands by stopping their works. See *Trades'-unions*.

String-course, in architecture, a narrow moulding or projecting course continued horizontally along the face of a building, frequently under windows. It is sometimes merely a flat band.

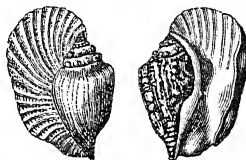
String-halt, a defect in a horse consisting in a sudden twitching of the hinder leg, or an involuntary or convulsive motion of the muscles that extend or bend the hough. Written sometimes *spring-halt*.

Strix. See *Owl*.

Strobilus, in botany, a catkin the carpels of which are scale-like, spread open, and bear naked seeds, as in the fruit of the pines; a cone.

Stromboli, one of the Lipari Islands in the Mediterranean, north of Sicily. It mainly consists of a volcanic cone constantly active; height, 3022 feet. See *Lipari Islands*.

Strombus, the name given by Linnaeus to a genus of gasteropodous shells, now broken up into several genera. The aperture is much dilated, the lip expanding and produced into a groove. In some of the



Winged Strombus (*S. tricornis*).

shells of this genus there are spines of great length arranged round the circumference of the base, being at first tubular, and afterwards solid, according to the period of growth. The giant strombus (*S. gigas*), or fountain-shell of the W. Indies, often forms an ornament in houses, and is largely used for cameos and in porcelain works.

Strongylus (stron'ji-lus), a genus of intestinal round-worms. *S. gigas* is the largest nematode worm at present known to infest man or any other animal, the male measuring from 10 inches to 1 foot in length, whilst the female is said to attain a length of over 3 feet.

Stronsay, one of the Orkney Islands, 12 miles N.E. of Kirkwall; about 7 miles long and $4\frac{1}{2}$ miles broad. It is of moderate elevation, and its coasts are deeply indented. The soil is mostly good, and is now well cultivated. Pop. 1159.

Strontia. See *Strontium*.

Strontium, symbol Sr, atomic weight 87.6, one of the alkali-earth metals, closely related to calcium and barium, but is less abundant than either of these. The oxide is *strontia*, SrO. The chief source is the carbonate, SrCO₃, *strontianite*, which was first discovered at Strontian in Argyleshire. It is used in sugar refining to aid in extracting sugar. The nitrate is extensively used in the composition of fireworks. Most of the compounds impart a bright crimson colour to a flame.

Strophanthin, a crystalline glucoside with a strongly bitter taste, obtained from the seeds of *Strophanthus hispidus*, a plant belonging to the natural order Apocynaceæ,

and a native of Africa. It is readily soluble in water, less so in alcohol, and is a muscle-poison, increasing the contractile power of the muscles. It has lately been used with great advantage as a tonic in heart disease. It strengthens the heart-beat and reduces its frequency. The natives of Africa use it as an arrow poison.

Strophe (Greek, *strophē*, from *strophō*, I turn), the name of one of the divisions of a Greek choral ode, corresponding to the *antistrophē*. The singing of the strophes on the stage was accompanied with a motion or turn from right to left; the singing of the antistrophe, with a contrary motion, from the left to the right.

Stroud (stroud), or **STROUDWATER**, a town of Gloucestershire, England, adjacent to the Slade and Frome, 9 miles south of Gloucester. It has spacious streets and several fine public buildings. It is a centre for cloth factories and dyeworks. There are also manufactures of ready-made clothing, pins, walking-sticks, &c. Up to 1885 Stroud was a parliamentary borough, and returned two members to parliament, the borough covering a large area. Pop. 9188.

Struensee (strū'en-zā), **JOHANN FRIEDRICH**, COUNT, born in 1737 at Halle on the Saale, studied medicine, and in 1768 was appointed physician to the King of Denmark. He soon became a favourite with both the king and queen, and effected the dismissal of all those who were obstacles to his own ambitious plans. In 1770 he advised the king (who was little better than an imbecile) to abolish the council of state, a measure which roused the indignation of the Danish nobility, since it threw all authority into the hands of the queen and the favourite. Struensee by various means gradually usurped the administration of all affairs in the name of the king, and caused himself to be created count. His arrogance now caused a conspiracy against him, and on Jan. 16, 1772, the queen, Struensee, and their partisans were seized. The favourite was brought before a special commission, was found guilty of criminal relations with the queen (on insufficient evidence), convicted, and executed on the 28th April, 1772.

Struthio. See *Ostrich*.

Struthionidae, a family of terrestrial birds incapable of flight, the wings being, in the majority of instances, merely rudimentary, but having long and strong legs, which enable them to run with great rapidity. This family includes the ostrich, cassowary,

emu, &c., and is equivalent to the Brevipennes of Cuvier and the Ratitæ of Huxley.

Strutt, **JOSEPH**, English antiquary, born at Chelmsford in 1749, was articled to W. W. Ryland, the engraver, and obtained the gold and silver medals of the Royal Academy. In 1773 he published his *Regal and Ecclesiastical Antiquities* from Edward the Confessor to Henry VIII. (new ed., 1842), and shortly afterwards his *Horda Angel-Cynnan, or Manners, Customs, &c.*, of the English (1774-76, three vols., with 157 plates). His other works include a *Chronicle of England* (two vols., 1777-78); *Biographical Dictionary of Engravers* (two vols., 1785-86); *Dresses and Habits of the People of England, &c.* (two vols., 1796-99, with 142 plates; new ed., 1875); and *Sports and Pastimes of the People of England* (40 plates, 1801; new ed., with 140 plates, 1827). He died in 1802. He left some manuscripts, from which were afterwards published his *Queenhoo-Hall*, a romance, concluded by Sir Walter Scott; *Ancient Times*, a drama; also *The Test of Guilt*, or *Traits of Ancient Superstition*, a dramatic tale.

Struve (strō'vè), **FRIEDRICH GEORG WILHELM VON**, astronomer, born at Altona 1793, and educated at Dorpat University. In 1813 he entered the Dorpat observatory, and was appointed director in 1817. On the completion of the Russian observatory at Pulkova, near St. Petersburg, in 1839, he was nominated its director, and here he continued his researches on nebulae and double stars. From 1816 to 1819 he was engaged on the triangulation of Livonia, and from 1830 to 1845 he was connected with the measurement of the arc of the meridian in the Baltic provinces, which was afterwards extended to the Arctic Ocean and the Danube. He died in 1864.

Stry, or **STRYT** (strē), a town of Austria, in Galicia, situated on a river of the same name. It was the scene of a great conflagration in April 1886, which destroyed over 600 houses and most of the public buildings. The chief manufactures are leather goods and matches. Pop. 23,673.

Strychnine (stri'k'nin; $C_{21}H_{22}N_2O_4$), an alkaloid existing in nux-vomica, St. Ignatius' beans, and in the seeds of various other plants of the genus *Strychnos* (which see). It is prepared by mixing the finely-powdered seeds with water and slaked lime, thoroughly drying, and extracting with benzene or chloroform. It crystallizes from alcohol in colourless four-

sided prisms, which are inodorous and intensely poisonous. One-eighth of a grain of strychnine is sufficient to kill a large dog; three-eighths of a grain produces violent tetanic spasms in man, while half a grain has been known to prove fatal. When taken in small doses for a long period of time the drug produces increased excitability of the nerves. Strychnine resists putrefaction, and may therefore be detected in bodies which have been buried for a long time. This alkaloid combines with acids, forming a series of well-defined salts; a series of strychnine derivatives is also known, in which the hydrogen is partly replaced by such groups as ethyl (C_2H_5), amyl (C_5H_{11}), &c.

Strychnos (strik'nos), a genus of plants, natural order Loganiaceae. It is composed of trees or shrubs which do not yield a milky juice, and have opposite, usually nerved leaves and corymbose flowers; some of the species are possessed of tendrils, and are climbing plants. They are found principally in the tropical parts of Asia and America. Among the species are *S. nux-vomica*, nux-vomica, poison-nut, or ratsbane; *S. potatorum*, or clearing-nut; *S. Ignatii*, or St. Ignatius' bean; *S. colubrina*, or snakewood; *S. toxifera*, woolly or poison-plant of Guiana. See the separate articles.

Styrye, REV. JOHN, ecclesiastical historian, born in London 1643, and educated at St. Paul's School, and Cambridge University, where he graduated B.A. in 1665. In 1669 he became vicar of Low Leyton, and remained there till within a few years of his death. He published nothing till after he was fifty, and his works consist for the most part of transcriptions of curious and valuable papers, which he brought to light for the first time. The chief of them are *Memorials of Cranmer* (1694), followed by the *Lives of Sir Thomas Smith* (1698), Bishop Aylmer (1701), Archbishop Parker (1711), and Archbishop Whitgift (1718). His *magnus opus* was *Ecclesiastical Memorials* (three vols., 1721). He died at Hackney in 1737.

Stuart (stü'ért), THE FAMILY OF. This house derives its name from the important office of steward of the royal household of Scotland. The name is often written *Stewart*, and occasionally *Stewart*. The form of *Stuart* was first assumed when Queen Mary went to France, and was adopted by all her descendants. The founder of the house seems to have been a Norman baron named ALAN, whose second son WALTER entered the ser-

vice of David I. of Scotland, and became *dapifer* or steward of the royal household. Walter obtained large grants of land from David, and died in 1246. ALEXANDER, the fourth steward, had two sons—JAMES, who succeeded him in 1283, and John, known in history as the Sir John Stewart of Bonkyl, who was killed at Falkirk (22d July, 1298). James was chosen as one of the regents on the death of Alexander III., and died in the service of Bruce in 1309. His son, WALTER, the sixth steward, married Marjory daughter of King Robert I., a union which secured to his family the crown of Scotland in the event of the extinction of the royal line. He died in 1326, and was succeeded by his son, ROBERT, the seventh steward, who, on the death of David II. without issue, succeeded to the crown as Robert II. in 1371. For the subsequent history of the royal line see the articles *Scotland*; *Robert II.*; *Robert III.*; *James I.*, *II.*, *III.*, *IV.*, *V.*; *Mary Stuart*; *James I. (of England)*; *Charles I. and II.*; *James II.*; *William and Mary*; and *Anne*. Mary of Modena, second wife of James II. of England, gave birth to James Edward Francis, prince of Wales, commonly called the Old Pretender, or the Chevalier St. George. In 1715 an unsuccessful attempt was made by the Jacobites, or Stuart party, to set this prince on the throne of his ancestors by force of arms. He married a granddaughter of John Sobieski, king of Poland, by whom he had two sons, Charles Edward, the Young Pretender (see *Charles Edward Stuart*), and Henry Benedict Maria Clement, who became a cardinal in 1747. A representative of the Stuart line directly descended from Henrietta Maria, daughter of Charles I. (who was married to Philip, Duke of Orleans), exists in the person of Maria Theresa of the Modena family, wife of Prince Louis of Bavaria. Many noble families of Scotland are also descended from the Stuart line.

Stuart, ARABELLA, born at Chatsworth in 1575, was the only child of Charles Stuart, earl of Lennox, brother of Lord Darnley, and was great granddaughter of Margaret Tudor, daughter of Henry VII.; thus being in the line of succession to the English throne. On the death of Queen Elizabeth, an abortive conspiracy was formed for setting up Arabella Stuart in opposition to her cousin James. Her private marriage to William Seymour, grandson of the Earl of Hertford, alarmed the court, and she and her husband were placed in confinement. They both

escaped, but the Lady Arabella was recaptured and placed in the Tower, where she remained a close prisoner until her death on September 27, 1615.

Stuart, CHARLES EDWARD. See *Charles Edward Stuart*.

Stuart, JOHN M'DOULL, a celebrated Australian explorer, born in Scotland in 1815. In 1844-46 he accompanied Sturt's expedition, and in 1858 he successfully explored the country west of Lake Torrens in South Australia. In 1862 he achieved the difficult task of crossing the Australian continent near the centre from south to north. He died in London 1866. He wrote *Explorations in Australia*, edited and published in 1864 by W. Hardman, London.

Stuart, MOSES, an American theologian, born at Wilton, Connecticut, in 1780, and educated at Yale College. He was called to the bar in 1802, but abandoned law for theology. In 1810 he was appointed professor of sacred literature at the theological seminary in Andover, a post he held for thirty-eight years, during which time he published several Greek and Hebrew grammars, commentaries on some of St. Paul's Epistles and on the Apocalypse, Hints on the Prophecies, A Critical History and Defence of the Old Testament Canon, and many other works. He died at Andover, Massachusetts, in 1852.

Stubbs, WILLIAM, D.D., English historian and divine, was born in 1825, and educated at Ripon Grammar-school, whence he proceeded to Oxford University and latterly became a fellow of Trinity College. In 1848 he was ordained, and became vicar of Navestock, Essex, in 1850. In 1862 he was appointed librarian of Lambeth Palace, in 1866 professor of modern history at Oxford, in 1869 curator of the Bodleian Library, in 1875 rector of Cholderton, Wilts, in 1879 canon residentiary of St. Paul's, in 1884 bishop of Chester, and in 1888 bishop of Oxford. He has edited many valuable historical works in the Rolls Series, including *Chronicles and Memorials of the reign of Richard I.* (1864-65); *Gesta Regis Henrici II.* (1867); *Chronicle of Roger Hoveden* (1872-73); *Memorials of St. Dunstan* (1874); and *Opera Radulphi de Diceto* (1876). His chief work is the *Constitutional History of England* (three vols., 1874-78). He published many other works besides the above, and was a member of various English and foreign learned societies. He died in 1901.

Stucco (stuk'kō), a fine plaster, used as a

coating for walls, and to give them a finished surface. Stucco for internal decorative purposes is a composition of very fine sand, pulverized marble, and gypsum, mixed with water till it is of a proper consistency. The stucco employed for external purposes is of a coarser kind, and variously prepared, the different sorts being generally distinguished by the name of cements. Some of these take a surface and polish almost equal to that of the finest marble. The third coat of three-coat plaster is termed stucco, consisting of fine lime and sand. There is a species called *bastard stucco*, in which a small portion of hair is used.

Studding-sails, formerly called *scudding-sails*, fine-weather sails set outside the square sails. The top-mast and top-gallant studding-sails are those which are set outside the top-sails and top-gallant-sails; they have yards at the head, and are spread at the foot by booms which slide out on the extremities of the lower and top-sail yards, and their heads or yards are hoisted up to the top-sail and top-gallant-sail yard-arms.

Stuffing-box, a contrivance for securing a steam, air, or water tight joint when it is required to pass a movable rod out of a vessel or into it. It consists of a close box cast round the hole through which the rod passes, and in which is laid, around the rod and in contact with it, a quantity of hemp or other material called *packing*, this packing being lubricated with oily matter. The stuffing-box is used in steam-engines, pumps, on the shaft of a screw-steamer where it passes through the stern, &c. See *Piston*.

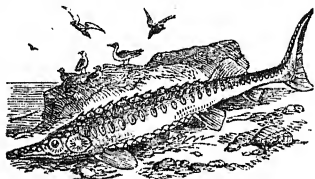
Stuhlweissenburg (stöl'vis-én-burh), a town of Hungary, 30 miles south-west of Budapest. It was for five centuries the crowning-place of the Hungarian kings, but has now lost its former importance. It contains some fine buildings, among which are a cathedral, built in 1752, a bishop's palace, and a theatre. Pop. 32,167.

Stupa. See *Dagoba*.

Sturdy, a disease to which sheep are liable, also called *staggers* (which see).

Sturgeon, a ganoid fish of the genus *Acipenser*, family Sturionidae, the members of which family are all popularly included under the name sturgeon. The general form of the sturgeon is elongated and rather slender, the snout long and pointed; the body is covered with numerous bony plates in longitudinal rows; the exterior portion of the head is also well mailed; the mouth placed under the snout is small and funnel-

shaped, without teeth, and provided with tentacle-like filaments or barbules. The eyes and nostrils are on the side of the head. On the back is a single dorsal fin, and the tail is forked, but is heterocercal or unequally lobed, and is provided with a row of spines along its upper margin. The sturgeons are sea-fish, but ascend the larger



Sturgeon (*Acipenser sturio*).

rivers of Europe in great abundance, and are the objects of important fisheries. The flesh of most of the species is wholesome and agreeable food; their roe is converted into caviare (see *Caviare*), and their air-bladder affords the finest isinglass. The common sturgeon (*Acipenser sturio*) is found off the British coasts, in the North Sea, in the Mediterranean, and in most of the large rivers of Europe. Its flesh is firm and well-flavoured, somewhat resembling veal. The general body colour is yellow; its length is usually 5 or 6 to 8 feet, but it may reach 12 feet. The food consists of molluscs, small crustaceans and small fishes. When caught in the Thames, within the jurisdiction of the Lord-mayor of London, it may be claimed by that dignitary; formerly it used to be regarded as a royal fish reserved for the sovereign. The sterlet (*A. ruthenus*) is found in the Volga and the Danube. Its flesh is the most delicate, and its roe yields the best caviare. The great or white sturgeon, or beluga (*A. huso*), is found in the Danube, the Volga, and other rivers running into the Black and Caspian Seas. It frequently exceeds 12 and 15 feet in length, and weighs above 1200 pounds. The flesh is not much esteemed, but the finest isinglass is made from its air-bladder. There are several species peculiar to North America. One of these, the fresh-water sturgeon (*A. rubicundus*), inhabits the great lakes and connected streams.

Sturluson, SNORRI. See *Snorri Sturluson*.

Sturnus. See *Starling*.

Sturt, CHARLES, Australian explorer, was born in Bengal on the 28th of April, 1795. He entered the army, and in 1825 was stationed

at Sydney, New South Wales, with the rank of captain. In 1828 he led an expedition to explore the interior of Australia, and discovered the Macquarie, Castlereagh, and Darling rivers. He also explored the Murrumbidgee, and in 1830 discovered the Murray. In 1844 he penetrated to the great barren region nearly in the centre of the continent. Subsequently he was made colonial secretary of South Australia, and the exposure to which he was subjected having undermined his health, he received a pension from the colony. He returned to England totally blind, and died in 1869. He wrote *Two Expeditions into the Interior of South Australia in 1828-31* (Lond. 1833), and *Narrative of an Expedition into Central Australia in 1844-46* (Lond. 1849).

Stuttering. See *Stammering*.

Stuttgart, capital of the Kingdom of Württemberg, S. Germany, beautifully situated near the left bank of the Neckar, and closely surrounded by vineyard slopes, 816 feet above the sea. With the exception of part of the lower and older town, it consists of spacious streets and squares lined with fine buildings, among the latter being the new palace, finished in 1807; the old palace (1570); the Stiftskirche, a Gothic structure of the 15th century; the Gothic hospital church, containing a statue of our Saviour by Dannecker; and several other churches; the royal library (400,000 vols.); the museum and picture-gallery; the polytechnic school; a great building containing the exchange and concert-rooms, &c.; the theatre, the town-house, and many other buildings. There are several high-class educational establishments, the polytechnic being the chief. Stuttgart is the chief centre in South Germany for the book trade, connected with which are paper-mills, type-foundries, printing-presses, and lithographic establishments. The other leading manufactures include dyes, chemicals, woollen and cotton goods, various fancy articles, jewelry, musical instruments, mathematical and scientific instruments, liqueurs, confectionery, and beer. Stuttgart dates from 1229, and in 1320 became the residence of the counts of Württemberg. From 1436 to 1482 it was much improved and enlarged, and has since, with only a short interval, been the capital. Eastward from Stuttgart, and almost connected with it by the royal palace grounds, is the town of Cannstatt. Pop. 249,286.

Stuyvesant (sti've-sant), PETER, born in Holland in 1602; in 1647 was made director-

general of the Dutch colony of the New Netherlands, a position he held until 1664, when the colony fell into the hands of the English and became known as New York. Stuyvesant went to Holland the next year, but soon returned, and passed the rest of his life at his farm called the Bouwerij, from which the present Bowery in the city of New York has its name. He died in 1682.

Stye (known also as *hordeolum*), a little boil on the margin of the eyelid, which commences in the follicle of one eyelash. Styes are most common in young people, especially in anæmic girls, and are mostly associated with some obvious derangement of the general health, which should be made the subject of treatment. The tumour generally bursts in a few days, and it is very seldom necessary to puncture it. Warm-water dressings with lint and oiled silk should be applied.

Style, in botany, the prolongation of the summit of the ovary which supports the stigma. Sometimes it is entirely wanting, and then the stigma is *sessile*, as in the poppy and tulip. When the ovary is composed of a single carpel, the style is also single, and the number of styles varies according to the number of carpels, though when the carpels are numerous the styles may be united.

Style, OLD and NEW. See *Calendar*.

Stylites (sti'lites), or **PILLAR SAINTS** (from the Greek *stylos*, column; in Latin, *sancti columnares*), a class of Christian saints, who, by way of penance, passed the greater part of their lives on the top of high columns. This method of self-torture was introduced by Simeon the Stylite (St. Simeon Stylites), a Syrian monk who lived in the open air near Antioch, on the top of a column 40 cubits high and only 3 feet in diameter at the top. Here he remained for many years, till his death in 459 or 460. It appears, however, that he must have descended at times, since he cured the sick by his touch, and performed sundry other miracles, wrote epistles, and took part in political quarrels. His example was imitated by many persons in Syria and Palestine, and the mania continued until the 12th century.

Stylobate, in architecture, generally, any sort of basement upon which columns are placed to raise them above the level of the ground or floor; but, technically, a continu-

ous unbroken pedestal upon which an entire range of columns stands, contradistinguished from *pedestals*, which are merely detached fragments of a stylobate placed beneath each column.

Sty'lops. See *Strepsiptera*.

Styptic, a remedy that has the virtue of clotting blood, or of closing the aperture of a wounded vessel. Oak bark decoction, gall-nuts in powder or infusion, matico, and turpentine, are styptics derived from the vegetable kingdom; and from the mineral are derived salts of iron, the sulphates of copper and zinc, the acetate of lead, the nitrate of silver, and alum.

Styrac'ceæ, **STYRACA'CEÆ**, a small natural order of plants belonging to the polycarpous group of monopetalous exogens. The species are trees or shrubs with alternate leaves without stipules. The flowers are usually axillary, and are either solitary or clustered, with membranaceous bracts; the fruit is a drupe, the seeds few or solitary. The species are chiefly found in the temperate and tropical parts of North and South America, and also in Asia and Africa. The order is chiefly remarkable for furnishing the storax and benzoin of commerce. Some of the species are used for dyeing yellow. The order includes the snowdrop-tree of North America (*Halesia tetraptera*).

Styrax (sti'raks), a genus of plants, nat. order Styracææ, of which it is the type. The species are elegant trees and shrubs, with entire leaves and white or cream-coloured racemose flowers. They are principally natives of America and Asia; one is found in Europe, and one in Africa. *S. officinalis*, also called storax, is a native of Syria, Italy, and most parts of the Levant. It yields the storax of commerce (which see). *S. Benzoin* (gum-benjamin tree) is a native of Sumatra and Java. It yields the gum benzoin of commerce. (See *Benzoin*.) The hardy species of *Styrax* are well adapted for shrubberies, on account of their foliage and handsome flowers.

Styr'ia (German, *Steiermark*), a duchy of Austria, bounded by Upper and Lower Austria, Hungary, Croatia, Carniola, Carinthia, and Salzburg; area, 8670 square miles. The whole duchy, with the exception of the southern part, is mountainous. The Noric Alps traverse the district between the Euns and the Mur; the Styrian Alps between the Mur and the Drave; and the Carnic Alps between the Drave and the Save. These mountains rise to a height of between 7000



a, Style; b, stigma.

and 8000 feet, and are rich in minerals. Styria belongs to the basin of the Danube, which drains it by means of the four rivers mentioned above. On the southern plains and in the valleys the land is fertile, and wheat, maize, hemp, flax, and the poppy are raised. The vine thrives well in many districts. The chief sources of wealth are the forests and minerals, dairy-farming, mining, and manufactures. Gratz is the capital. Pop. 1,356,058, the majority of whom are of German descent.

Styx, in Greek and Roman mythology, the name of a river of the infernal regions. Styx was also a rivulet in Arcadia, whose water was considered poisonous.

Suabia, or **SWABIA** (German, *Schwaben*), an ancient German duchy which, after bearing the name of Alemannia, from its original inhabitants the Alemanni, changed it to Suevia or Schwabenland, in consequence of the incursion of the Suevi. On the division of the kingdom of the Franks in 843, Suabia, along with Bavaria, became as it were the nucleus of Germany, and its rulers continued for many centuries to hold a prominent place in German history. In 1376 was formed, chiefly by the union of its towns, the celebrated Suabian League. From 1512 to 1806 Suabia formed one of the ten circles into which the German Empire was divided. It is now divided between Württemberg, Baden, Bavaria, Hohenzollern, and Lichtenstein. The name of Suabia is given to a division of Bavaria; area, 3730 square miles; pop. 750,888. Augsburg is its capital.

Suahe'li, a name given to the inhabitants of a considerable part of the coast of Eastern Equatorial Africa and the adjacent islands, a people of mixed Arabic and native African origin. They form the most important part of the subjects of the Sultan of Zanzibar, and their language is the common medium of communication in East Africa.

Sua'kin, or **SAUAKIN**, a seaport of the Anglo-Egyptian Soudan, on the Red Sea. The principal part of the town lies on a small rocky island, but there is also a portion (El Kaff) surrounded by fortifications on the mainland. The Mahdist rising in the Soudan ruined for a time the trade of Suakin, but it is again considerable. It is now connected with Port Soudan (a seaport farther north) and with Berber on the Nile by a railway completed in 1905. It was occupied by the British in con-

nection with the Soudan troubles in 1882. Pop. about 10,000.

Sua'rez, **FRANCIS**, one of the most eminent scholastic and polemical writers of the Roman Catholic Church, was born at Granada 1548, died at Lisbon 1617. He entered the society of Jesuits in 1564, and soon became professor in succession at Valladolid, Rome, Alcalá, and Salamanca. In 1597 Philip II. appointed him principal professor of divinity at the University of Coimbra, a position he held until his death.

Subia'co (ancient, *Sablaqueum*), a town of Italy, province of Rome, on a height near the right bank of the Teverone, 34 miles east of Rome. It has a fine old castle, formerly often occupied by the popes; remains of Nero's villa; and in the neighbourhood interesting monasteries. Pop. 8000.

Subject. See *Object*.

Sublapsarians, in theology, those who maintain the doctrine that the decrees of election and reprobation were made by God in foresight of and regard to the fall of Adam and the sin imputed to all his posterity, wherefore, in compassion, he decreed to send his Son to rescue a great number from their lost state, and to accept his obedience and death on their account. The decree of reprobation, according to the Sublapsarians, is nothing but a passing over or non-election of persons, whom God left as he found, involved in the guilt of Adam's transgression, when he withdrew some others as guilty as they. *Sublapsarian* is opposed to *supralapsarian*.

Sub-lieutenant, in the British army, from 1871 to December 1876 the lowest rank of commissioned officers. At the latter date the title of second lieutenant was substituted for sub-lieutenant.

Sublimate, **CORROSIVE**. See *Corrosive Sublimate*.

Sublimation, the conversion of a solid directly into a vapour or gas when heated, and the conversion back into the solid on cooling, without, in either case, the intermediate formation of a liquid phase. Sublimation bears the same relation to a solid that distillation does to a liquid. It is made use of for purifying substances, as in this way a volatile solid may be separated from a non-volatile one. The solid which is deposited as the vapour cools is termed the *sublimate*; when this is in a very fine state of division it is sometimes spoken of as *flowers*; such are the *flowers* of sulphur, *flowers* of benzoin, and others of the same

kind. Camphor, ammonium chloride, mercuric chloride, and various compounds are purified by this method, and are deposited as hard, compact masses.

Sublime, THE. This term is applied both to that quality of objects which produces a mingled feeling of pleasure and awe and to the emotion itself. The invariable condition of the sublime in objects, either material or moral, is vastness, power, or intensity. The invariable condition of the emotion of sublimity—that which distinguishes this emotion from every other emotion—is a comprehension of this vastness or power, with a simultaneous feeling of our own comparative insignificance. The antithesis to the emotion of sublimity is the emotion of contempt. In every case of sublimity in material objects, whatever feelings may simultaneously concur, vastness will be found to be an invariable condition—vastness either of form or of power, as in the violent dashing of a cataract, in the roar of the ocean, in the violence of the storm, in the majestic quiet of Mont Blanc, preserving its calm amidst all the storms that play around it. In the moral world the invariable condition of sublimity is intensity. Lear, who appeals to the heavens, 'for they are old like him', is sublime from the very intensity of his sufferings and his passions. Lady Macbeth is sublime from the intensity of her will, which crushes every female feeling for the attainment of her object. In all such cases we are moved by a vivid feeling of some will or power greater than our own.

Sublime Porte. See *Porte*.

Submarine Cable, a rope of wires and insulating materials laid along the bed of a sea or ocean through which telegraphic messages are transmitted. The conducting portion of such cables consists of a number of pure copper wires twisted into a strand and usually covered with alternate coatings of a pitchy mixture and gutta-percha. This core is then covered with Manilla yarn and twisted iron wires. The first attempt to lay a submarine cable was made in 1850 between Dover and Calais, but the cable only lasted a few hours owing to friction against the rocks. However, electric communication across the channel was re-established not long after. The first Atlantic cable, from Ireland to Newfoundland, was successfully laid by the *Great Eastern* in 1866, after unsuccessful attempts in 1857, 1858, and 1865. Long submarine cables

now connect nearly all parts of the world. (See map at *Britain*.) The longest stretch is from Vancouver to Fanning Island, 3458 miles. Signals through the cables are generally recorded by Lord Kelvin's mirror galvanometer and siphon recorder, which enables the transmission of messages to be carried on with great rapidity. See *Telegraph (Electric)*.



Submarine Forests, a term applied to beds of impure peat, largely consisting of roots, stems, and branches of trees, &c., occupying the sites on which they grew, but which by change of level are now submerged by the sea. Such submarine forests do not contain any trees that are not found growing at the present time. They belong to the recent or quaternary period of geologists, and occur among the boulder-clay.



Submarine Cable.

Submarine Vessels, vessels intended to be propelled for longer or shorter periods under water. Such vessels offer no advantages for ordinary navigation, and are so dangerous at the best that they are never likely to be used for commercial purposes, but they have been introduced in recent years into all the principal war navies. The first British submarines, of the type named from their American inventor, J. P. Holland, were completed in 1901. They are 63½ ft. long and 11½ ft. in beam, and their displacement when submerged is 120 tons. In shape they are described as double-pointed spindles with a conning-tower on the back, and vertical and horizontal rudders. They are built of steel strong enough to withstand water pressure at depths not exceeding 100 feet, and like other warships they are provided with bulkheads. At the surface they are propelled by gasoline marine engines of a special type, and can attain a speed of 8 knots. When submerged they are driven by 'waterproof' electric motors at a speed of 7 knots, the motors being worked by accumulators sufficient for a four-hours' journey. Incandescent electric lamps supply light when the vessel is submerged. The supply of air to the crew is provided for by the storage of compressed air. Steering and diving can be effected either by means of hand-gear or by special engines. The armament consists of a torpedo-tube at the bow. Longitudinal stability is diffi-

cult to maintain; diving in rough water is dangerous; and so far no completely satisfactory means of gauging direction and position when submerged has been devised. In small vessels containing much steel and electrical apparatus the compass is unreliable. Greatly improved submarines of 300 tons, 850 horse-power, and a surface speed of 13 knots, were added to the British navy in 1906. Submarine navigation dates back for some time, but in its present form it is not much older than the last decade of the nineteenth century. There have been so many fatal accidents to these vessels that it has been proposed to prohibit their use by international agreement.

Subornation of Perjury, the crime of inducing a person to commit perjury, punishable similarly to perjury. See *Perjury*.

Subpœna, in law, is a writ commanding a witness to appear in court under a penalty (*sub pœna*), which in England is of £100. When he is required to bring books or papers in his possession, a clause is inserted to that effect, and the writ is then called a *subpœna duces tecum* ('bring with you under penalty'). A witness is allowed his travelling expenses.

Subsidence. See *Geology*.

Subsidy, a term now used to denote the pecuniary assistance afforded, according to treaty, by one government to another, sometimes to secure its neutrality, but more frequently in consideration of its furnishing a certain number of troops. *Subsidy*, in England, was formerly an aid or tax granted to the crown for the urgent occasions of the kingdom, and was levied on every subject according to the value of his lands or goods.

Substance, in a philosophical sense, is contradistinguished from *accident*, and signifies that which exists independently and unchangeably; whilst accident denotes the changeable phenomena in substance, whether these phenomena are necessary or casual, in which latter case they are called accidents in a narrower sense. Substance is, with respect to the mind, a merely logical distinction from its attributes. We can never imagine it, but we are compelled to assume it. We cannot conceive substance shorn of its attributes, because those attributes are the sole staple of our conceptions; but we must assume that substance is something different from its attributes. Substance is the unknown, unknowable substratum on which rests all that we experience of the external world.

Subularia, a genus of plants, nat. order Cruciferae, found in the gravelly bottoms of lakes, usually in shallow water, in North and Central Europe, North Asia, and the Northern United States. *S. aquatica*, or awlwort, the only species, consists merely of a tuft of white fibrous roots, narrow awl-shaped leaves, and a leafless stalk, bearing a few small white flowers. It is indigenous to Scotland and the north of England and Ireland.

Subways, tunnels cut or built for various purposes beneath the public streets of large towns. In order to relieve the overcrowded condition of the London streets, the construction of an underground railway was suggested, and in 1855 a company was formed for this purpose. After overcoming many engineering difficulties the work was successfully completed, and in January 1863 the first underground railway was opened to the public. The term subway, however, is less commonly applied to railways than to tunnels for sewers, gas and water pipes, &c. Subways of this kind are now constructed under most of the new London streets with the view of doing away with the nuisances caused by the stoppage of traffic when the roadway is torn up to allow a gas or water main to be laid or repaired. Subways of a similar nature have been formed in some of the more important towns in Britain.

Succession. See *Act of Settlement*, *Descent*; also under *Apostolic*.

Succession Duty, in Britain, a duty payable by persons who succeed to real or personal property. The interest of a successor in real property is considered as an annuity on his life, and duty is paid according to the value of the annuity. To a child or parent, or any lineal descendant or ancestor of the deceased, the succession duty chargeable is *one* per cent; to a brother or sister, or their descendants, *three* per cent; to an uncle or aunt, or their descendants, *five* per cent; to a great uncle or great aunt, or their descendants, *six* per cent; to any other relation, or any stranger in blood, *ten* per cent. No duty is charged on an estate under £100 in value. A husband or wife is exempt from the duty, also a child where *estate duty* is paid. See *Death Duties*.

Succession Wars, wars which have arisen from claims for the possession of the crown on the occasion of a sovereign dying without undisputed legal heirs. In modern European history the most important of these struggles were those of the *Spanish succession*,

SUCCESSION WARS.

(1700-13), and of the *Austrian succession* (1740-48). Shortly before the death of Charles II. of Spain, without issue or collateral male heirs, several competitors laid claim to the throne, the two principal being the dauphin of France, son of Charles's eldest sister, and the Emperor Leopold of Austria, who claimed, in right of his mother, Mary Ann, daughter of Philip III. of Spain. The other powers were greatly interested in this question, since the union of either France or Austria with Spain would have endangered the balance of power in Europe. After much negotiation Philip of Anjou was put forward by Louis XIV. to represent the French claim, and Leopold nominated his second son Charles as his substitute, both parties declaring that Spain should never be incorporated with their respective dominions. The king of Spain eventually recognized Philip as his heir, and on the king's death in Nov. 1700 Philip was proclaimed at Madrid. He was recognized by most of the European powers except Austria, which in 1701 began a war against France; and the arrogant and aggressive behaviour of Louis, and his recognition of the son of James II. as king of England, caused England, Holland, and Austria to combine against him and Philip in 1702. Prince Eugene of Austria had already opened the contest in 1701, and had defeated the French at Carpi (July) and at Chiari (Sept.). In 1702-3 Marlborough, at the head of an allied Anglo-Dutch-German army, reduced the French strongholds along the Meuse and in the Low Countries. In 1704 Marlborough and Eugene joined their forces and defeated the Franco-Bavarian army at Blenheim (Aug. 13). Barcelona was captured by an English force in 1705, and the Earl of Peterborough gained some brilliant successes in this quarter. On May 23d, 1706, the French were defeated by Marlborough at Ramilies, and again at Turin by the Austrians in September. In April, 1707, a Franco-Spanish force under the Duke of Berwick routed an Anglo-Portuguese army at Almanza, Spain. In the following year Marlborough and Eugene reunited their forces and severely defeated the French at Oudenarde (July 11). The resources of France were now almost crippled, and Louis made overtures of peace which were rejected. The struggle was renewed with great vigour; Villars, with a French army of nearly 100,000 men, proceeded against Marlborough and Eugene, but he was defeated by

the allies at Malplaquet on Sept. 11, 1709. In Spain the French had entirely gained the upper hand by next year. The war dragged on until the accession in 1711 of the Archduke Charles to the Austrian throne changed the whole aspect of affairs, and the war, so far as Britain, France, and Holland were concerned, was brought to an end by the Peace of Utrecht in 1713. Peace between Britain and Spain soon followed, Britain gaining Gibraltar (taken in 1704 by Admiral Rooke) and Minorca. Latterly the Emperor Charles, forsaken by his allies, was reluctantly compelled to sign a treaty at Baden on Sept. 7th, 1714, recognizing Philip V. as the king of Spain. See *Utrecht, Peace of*.

The war of the Austrian succession arose on the extinction of the male line of the house of Hapsburg, by the death of the emperor Charles VI., 20th October, 1740. By diplomatic negotiations before his death, and by means of the settlement called the Pragmatic Sanction (which see), Charles had endeavoured to secure the Austrian succession for his daughter Maria Theresa. But there were several other claimants for the Austrian possessions, which included Bohemia, Hungary, Northern Italy, part of the Netherlands, and Austria proper. Besides Maria Theresa, the other claimants of importance were Charles Albert, elector of Bavaria, and Philip V. of Spain; while the chief European powers which took an interest in the succession were France, Prussia, and England. The first movement in the general scramble was made by Frederick II. of Prussia, who, in Dec. 1740, marched his army into Silesia, and secured the four duchies in that province as his share of the spoil. In the following year an agreement was entered into between France, Spain, Bavaria, Prussia, Saxony, Sardinia, and Naples, in terms of which a French-Bavarian army entered Upper Austria, another French army invaded the Austrian possessions in the Netherlands, and the forces of Spain and Naples occupied the Austrian territory in Northern Italy. This having been done, the coalition arranged that Charles Albert should be crowned (January 1742) as Emperor of Germany under the title of Charles VII., and this was accomplished at Frankfort. Meanwhile Maria Theresa appealed for help to the Hungarian diet at Presburg with such effect that the Magyar horsemen promptly invaded Bavaria and captured the city of Munich.

She also formed an alliance with England, in accordance with which the English government furnished her with money, sent a fleet to Naples to demand the withdrawal of Neapolitan troops from Austrian territory, and supplied a portion of the army which, under George II., defeated the French forces at Dettingen (1743). After this event negotiations for peace were begun, but with so little success that another league was formed including England, Holland, Austria, Saxony, and Sardinia, and a general European war broke out. Among the more important events of this general conflict were the second Silesian war, begun by Frederick II.; an attempted invasion of England by France in favour of the Pretender; and the brilliant campaign in the Netherlands conducted by Marshal Saxe, and terminating (May 1745) in the victory of Fontenoy, where the English and allies under the Duke of Cumberland were defeated. In 1745, however, the Emperor Charles VII. died, and his son, Maximilian Joseph, gave up all claim to the Austrian throne, and concluded peace with that country; and in the same year the husband of Maria Theresa was elected emperor under the name of Francis I. (See *Maria Theresa*.) War was still continued against Austria by Frederick II. of Prussia and the French forces under Marshal Saxe, but ultimately a definite treaty of peace between all the powers was signed in 1748 at Aix-la-Chapelle. See also *Frederick II.*, *Prussia*, *Austria*, &c.

Succinic Acid ($C_4H_4O_4$), an acid obtained originally by the dry distillation of amber, but at the present time usually prepared artificially, often by fermenting a solution of ammonium tartrate. It forms large, colourless prisms melting at $182^\circ C$.

Suchet (sü-shä), LOUIS GABRIEL, Duke of Albufera, Marshal of France, born at Lyons in 1770, entered the military service at an early age (1790), and served with distinction under Napoleon, Masséna, Joubert, and Moreau in the Italian and Swiss campaigns. He attained the rank of lieutenant-general before he was thirty, and in 1808 he received the command of a division in Spain, and was almost constantly victorious till after the battle of Vittoria. His brilliant services in that country obtained him the marshal's staff, and the title of duke. After the restoration Suchet was created peer of France. He lost his peerage through going over to Napoleon before Waterloo, but recovered it in 1819. He died in 1826.

Suchow. See *Soo-chow-foo*.

Sucker, or **SUCKING-FISH**, a name applied popularly to the Remora (which see); to the lump-sucker (which see); and also to the fishes belonging to the teleostean genus *Lipäris*, which is nearly allied to the lump-suckers. The best-known forms are Montague's sucker (*Lipäris Montagui*) and the common sucker or sea-snail (*L. vulgaris*), which adhere to stones and other fixed objects by means of their united ventral fins. They are small fishes, 3 or 4 inches long.

Suckling, SIR JOHN, a wit, courtier, and dramatist, born in 1609, at Whitton, in Middlesex, and educated at Trinity College, Cambridge. In 1631-32 he served as a volunteer under Gustavus Adolphus. In 1639 he equipped a troop of horse for the service of Charles I. against the Scotch. Being implicated in a plot to rescue the Earl of Strafford from the Tower he was obliged to flee to France, where he is said to have committed suicide in 1642. His writings consist of letters, written with ease and spirit; some miscellaneous poems, including ballads and songs, which for grace and elegance of style are inimitable; a prose treatise entitled *An Account of Religion by Reason*; and several plays—*Aglaura*, the *Goblins*, *Brennoralt*—which were probably the first plays produced with stage scenery on an elaborate scale.

Sucre. See *Chuquisaca*.

Sucre (sö'krä), ANTONIO JOSE DE, was born in 1793 at Cumana in Venezuela. He engaged in the rising against Spain in 1811, attained the rank of brigadier-general in 1819, and in 1822 won the decisive victory of Pichincha, which forced the Spaniards to evacuate Quito. In 1824 he routed the Spanish forces at Ayacucho, thus liberating Upper Peru, which was turned into a republic called Bolivia, of which Sucre was elected president in 1826. An insurrection broke out in 1828, and Sucre was driven from the country, but returned at the head of a Colombian army and reinstated himself. He was assassinated in June 1830.

Sucto'ria ('sucking animals'), also called *Discophora* and *Hirudinea*, an order of Annelida or worms, represented by the leeches (which see) and their allies.

Sudan. See *Soudan*.

Sudbury, a municipal borough of England, in the county of Suffolk, 22 miles west of Ipswich, on the left bank of the Stour. It is neat, clean, and well built, and has three old churches, an hospital, a grammar-school,

and several other public buildings. Manufactures include silk, velvet, and cocoa-nut matting, lime, and bricks. There is a considerable river trade. Sudbury gives name to a parl. div. Pop. 7109.

Sudetengebirge (sû'dā-tŋ-ge-bir-gé), a mountain-chain of Europe, which separates Prussian Silesia from Moravia, and connects the Riesengebirge with the Carpathians. The mountains are generally low, the highest peak being Spiegltitzer-Schneeberg, about 5000 feet high, and are chiefly composed of granite. They are rich in coal and metals, and are well wooded.

Sádras. See *Sodras*.

Sue (sü), MARIE-JOSEPH-EUGÈNE, French novelist, born at Paris in 1804. He adopted his father's profession of medicine, became a surgeon in the army, and served in Spain in 1823. In 1825 he joined the naval service, and in the capacity of surgeon was present at the battle of Navarino in 1827. On his father's death in 1829 he inherited an immense fortune, and, having abandoned his profession, he devoted himself to literary composition. His first work was a sea novel entitled *Kernock le Pirate*, which was quickly followed by *Plick et Plock*, *Atar-Gull*, *La Salamandre*, and *La Vigie de Koatven*. He now entered the departments both of historical fiction and the novel of real life. Of the former description were *Latreumont*, *Jean Cavalier*, and *Le Commandeur*; of the latter were *Arthur*, *L'Hôtel Lambert*, and *Mathilde*. But his most famous works are *Les Mystères de Paris* and *Le Juif Errant*, well known in English as *The Mysteries of Paris* and *The Wandering Jew*. His later novels are *L'Enfant Trouvé*, *Les Sept Péchés Capitaux*, and *Les Mystères du Peuple*. In 1850 he was elected to the Constituent Assembly, and sat as an advanced radical. After the *coup d'état* by Napoleon III. in 1851 he left France and retired to Annecy, where he died in 1857.

Sueaborg. See *Sveaborg*.

Sueca (sy-ā'kā), a prosperous and well-built town of Spain, on the left bank of the Júcar, 23 miles south of Valencia, a few miles from the Mediterranean. Pop. 13,886.

Suet, the fatty tissue situated about the loins and kidneys of certain domestic animals, especially the ox and sheep, and which is harder and less fusible than the fat from other parts of the same animals. Beef-suet is much used for culinary purposes, and purified mutton-suet forms an ingredient in ointments, cerates, and plasters.

Suetonius, CATUS SUETONIUS TRANQUILUS, a Roman writer, the son of a military tribune, flourished about 100 A.D. Little is known of the circumstances of his life. He distinguished himself as an advocate, and enjoyed the patronage of the younger Pliny. He became secretary (*magister epistolarum*) to the Emperor Hadrian, but was dismissed on account of his intimacy with the Empress Sabina. His chief work, *Vitæ Duodecim Cæsarum* (*Lives of the Twelve Cæsars*), gives an interesting account of the private life and personal character of the twelve first Roman emperors from Julius Cæsar to Domitian, and is of great value to us from the light which it throws on domestic manners and customs.

Sueur, LE. See *Lesueur*.

Suevi, the general name of a number of united tribes who, before the Christian era, inhabited parts of Germany. The confederation included the Marcomanni and the Semnones, the former inhabiting what is now Bohemia, and the latter the present Lusatia and Brandenburg. The Suevi of Cæsar lived between the Rhine and the Weser. In the great migration of the northern nations the Suevi joined the Alans, entered Gaul, and in 409 Spain. After the Vandals had gone to Africa the Suevi spread as far as Portugal. They were overcome and absorbed by the Visigoths in 586. Those of them who remained in Germany were the ancestors of the present Suabians.

Suez, a town of Egypt, situated at the Red Sea terminus of the Suez Canal, 76 miles E. of Cairo, with which it is connected by rail. Previous to the construction of the Suez Canal, and the fresh-water canal from the Nile (see next article), it was an ill-built and miserable place, but is now in a fairly flourishing condition. Among the principal buildings are the Greek church, viceroy's villa, two hospitals, custom-house, &c. Pop. 17,500.

Suez Canal, the great ship-canal without locks now connecting the Mediterranean with the Red Sea; running from Port Said on the former to Suez on the latter, a distance of nearly 100 miles. According to Herodotus a large canal from the Red Sea to the Nile was constructed about 600 B.C. This canal, which seems never to have been of much use, was finally blocked up about 767 A.D. Napoleon I. had conceived the idea of making a ship-canal across the isthmus of Suez. In 1854 the French engineer M.

SUZ CANAL — SUFFRAGE

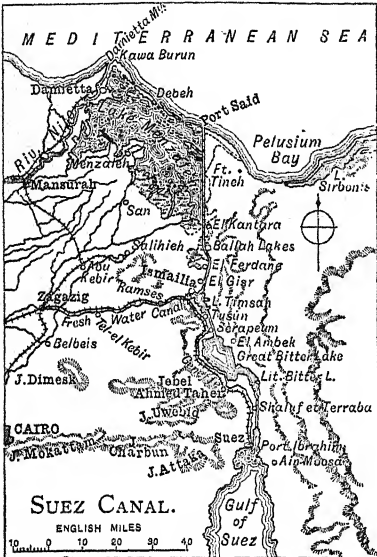
Ferdinand de Lesseps obtained a concession for that purpose, and in 1858 was able to form a company for carrying on the work. Operations were begun on the 25th April, 1859, and on the 17th November, 1869, the canal was opened; the total cost of construction was nearly £16,000,000. There were 75 miles of actual excavation, the remaining

his interest in the canal, consisting of 176,602 shares, for the sum of £4,000,000. The shipping passing through the canal has steadily increased since its opening, and now amounts to about 19,000,000 tons annually, carrying 270,000 passengers, while the receipts are over £4,000,000. About two-thirds of the tonnage passing through belongs to Britain. Navigation at night by aid of the electric light began in 1887, and the time of passage has now been shortened by about one half, viz. to about fifteen or eighteen hours. The distance between London and Bombay by the old route round the Cape is about 11,220 miles; by the canal route, 6332. Steam-ships are allowed to sail at a speed of five to six knots an hour along the canal.

Suffolk (suf'ok; literally south-folk), a maritime county of England, bounded by the German Ocean, Essex, Norfolk, and Cambridgeshire. It has a coast-line of about 50 miles, and an area of 1500 square miles, or 952,710 acres. It has five parliamentary divisions, each returning one member. The county is intersected by several rivers, among them being the Lark, a tributary of the Great Ouse; the Stour, which passes Sudbury and flows into the sea at Harwich; the Gipping, which runs from Stowmarket to Ipswich, and thence, under the name of the Orwell, to Harwich, where it unites with the Stour; the Deben, the Alde, and the Blythe. Suffolk is for the most part flat, and the soil on the north-western and eastern borders of the county is very sandy. The centre consists of a fertile tract of strong clay, and loam is met with on the borders of the rivers. Wheat, barley, pease, beans, and mangold-wurzel are grown to perfection, and the barley is much used by brewers. The sea has made great encroachments on the Suffolk coasts, and has partially destroyed some once considerable towns, as Dunwich and Aldeburgh. The seaports export corn and malt, and herring, mackerel, and oyster fisheries are carried on. Suffolk has but two parliamentary boroughs, Ipswich (the county town) and Bury-St.-Edmunds. Pop. 334,292.

Suffragan. See *Bishop*.

Suffrage, the right to vote for any purpose, but more especially the right of a person to vote in the election of his political representative. Many writers advocate the universal extension of this right, but in Britain and most European countries it is limited by a household or other qualification. It is generally held by leading politicians



25 miles being through shallow lakes (Lake Menzaleh, Lake Timsah, Bitter Lakes), which usually had to be deepened. For about four-fifths of its length it was originally 327 feet wide at the surface of the water, 72 at the bottom, and 26 deep; for the remainder only 196 feet wide at the top, the other dimensions being the same; but the increase of traffic has led to its being widened and deepened quite recently. A canal was also constructed for bringing fresh water from the Nile at a point near Cairo. This canal reaches the salt-water canal at Ismailia, and then runs almost parallel to the ship-canal to Suez. It is almost 40 feet wide and 9 deep, and is used for navigation as well as for domestic purposes and irrigation. The land on both sides of the ship-canal is to be retained by the company for ninety-nine years. In November 1875 the British government bought from the Viceroy of Egypt

that the extension of the suffrage should proceed gradually with the advance of education.

Sufism, the pantheistic mysticism of the Mohammedan East, which strives for the highest illumination of the mind, the most perfect calmness of the soul, and the union of it with God by an ascetic life and the subjugation of the appetites. This pantheism, clothed in a mystico-religious garb, has been professed since the 9th and 10th centuries by a sect which at present is gaining adherents continually among the more cultivated Mohammedans, particularly in Persia and India. The name is from *sufi*, a religious ascetic, an Eastern term applied to all members of religious monastic bodies leading an ascetic life. The Sufis were originally devout persons who, perplexed by the discord prevailing among the various systems of Mohammedan philosophy in the second century of the Hejra, found consolation in pious mysticism. Their teachings, though at first consonant with orthodox Mohammedanism, gradually led to a mode of thought totally irreconcilable with the Koran. About the beginning of the 10th century the Sufis divided into two branches, one of which followed Bostanie, who openly embraced pantheism, and the other Juneid, who sought to reconcile Sufism with Mohammedanism. Among eminent Persian poets belonging to the Sufis we may mention Hafiz and Jami. The celebrated philosopher Alghazzali was also a Sufi.

Sugar, the name given to a whole group of compounds built up of carbon, hydrogen, and oxygen. They all have a more or less sweet taste, a neutral reaction to vegetable colours, and are soluble in water. The sugars are mainly of vegetable origin; they can be crystallized, and when in solution rotate the plane of a ray of polarized light. The commonest sugar is *cane-sugar*, a compound represented by the formula $C_{12}H_{22}O_{11}$, and obtained not only from the sugar-cane, but also from beet-root, and in America from the sugar-maple. It is supposed that the sugar-cane was first cultivated in India, but a knowledge of the cane and of the method of cultivating it was brought from Persia by the Arabs, and given by them to Europe. The Spaniards planted it at home and in the Canaries, the Portuguese carried it to Madeira (1490), and it then spread to the West Indies and South America. During the middle ages Venice was the emporium of the trade in sugar. There is a record

that so early as 1319 it was shipped from the latter port to London. It was, however, chiefly used in medicine or as a mere luxury until the beginning of the nineteenth century, when it became a staple food in connection with tea and coffee.

Sugar is principally prepared from the sugar-cane and from beet. (See *Sugar-cane* and *Beet*.) The canes are first passed through a pair of grooved rollers in order to flatten them, and are then subjected to 3 or even 4 successive crushings between pairs of flat rollers; as a rule the crushed canes are macerated with water between the second and third crushings. By this process some 68–80 per cent of the juice is extracted. Immediately after crushing lime is added to the juice, in order to neutralize any acid present. The juice is heated in order to coagulate albumin, allowed to remain in settling tanks, and the clear juice is concentrated (that is, freed of water) in a vacuum in 'multiple effect' evaporators, consisting of vertical vacuum-pans with vertical heating tubes. The last operations consist in crystallizing in special vacuum-pans and freeing the crystals from syrup (molasses) in centrifugals. As a rule the canes contain some 7–9 per cent of sugar, but occasionally the amount is as much as 12–14 per cent. The percentage of sugar in German beet is 12.79 and in French 11.6. Successful enough attempts have been made to cultivate the sugar-beet in England and Ireland from time to time. The old method of extraction was to reduce the washed roots to a pulp and then subject this to hydraulic pressure. At the present time the usual method is to reduce the roots to large, evenly-cut slices by machinery, and then to subject these to a process of diffusion in a battery of extractors. The sugar is thus completely extracted by repeated treatment with warm water. The extracted slices are dried, compressed, and then used as feeding-cake for cattle. The juice is treated with lime, and then saturated with carbon dioxide and passed through filter presses, the solid retained by the press being employed as a manure. The colour is then removed by sulphurous acid, and the process of liming and passing in carbon dioxide repeated. In some factories calcium manganate is used for decolorizing. The clear juice is evaporated, crystallized, and purged in centrifugals in much the same manner as the juice from the canes. For the purpose of refining—a process necessary with both kinds of sugar—the raw sugar is

dissolved in hot water, filtered through cotton bags, and passed through a layer of animal charcoal. It is then concentrated in vacuum-pans, the requisite heat being introduced by steam-pipes. The sugar-syrup is then run out and allowed to crystallize in conical-shaped vessels of clay, sheet-iron, or *papier-mâché*. In these vessels the crystalline mass assumes its marketable form, from which it derives the name of *loaf-sugar*. After draining the sugar in the moulds the juice is completely removed by a centrifugal machine; the sugar-loaf is then dried. In the centrifugal machines an arrangement is now often introduced whereby the crystalline masses are given an appearance as though turned out from a mould. The pure product, whether obtained from the cane, from beet, or from the maple, is the same chemical substance, termed *sucrose* or *cane-sugar*. Other sugars having the same formula are *malt-sugar* or *maltose*, and *milk-sugar*. From the syrup which drains off an inferior sugar is obtained, and the remaining uncrystallized syrup is sold as *molasses*. *Rum* is obtained from molasses and cane-juice scummings by fermentation and distillation. *Sugar-candy* is prepared by boiling sugar-syrup with a little animal charcoal, clearing with white of egg, boiling down over an open fire, and crystallizing. Sugar-candy is known in commerce as *refined-white*, *yellow-candy*, and *brown-candy*, according to its purity. Sugar-candy is largely used for making liqueurs, sweetening champagne, &c.

A simpler sugar is the substance known as *glucose*, *dextrose*, or *grape-sugar*, $C_6H_{12}O_6$. It occurs in many natural fruits, such as the peach, plum, currant, apple, and grape, in quantities varying from 1.5 per cent in the peach to 15 per cent in the grape. It also forms the solid crystalline portion of honey. Grape-sugar may be obtained from grape-juice by heating it with marble, filtering, clearing with ox-blood, evaporating, and crystallizing. It is, however, generally prepared by boiling starch with dilute sulphuric acid; the clear liquid is then run off from the precipitate, evaporated by steam, filtered through animal charcoal, and run into the crystallizing vessels. It is largely used by brewers and wine makers, and is not so sweet as cane-sugar. Dextrose and cane-sugar belong to the class of fermentable sugars. When boiled with dilute acids cane-sugar yields a mixture of equal quantities of dextrose and *lævulose*, the mixture

being known as invert-sugar. *Lævulose*, $C_6H_{12}O_6$, is also present in honey and various fruits. Cane-sugar crystallizes in large monoclinic prisms, which when broken exhibit phosphorescence. At 160° it melts to a clear liquid, which solidifies as it cools, and is then known as *barley-sugar*.

The quantity of cane-sugar in a solution which contains no other substance may be estimated by determining the specific gravity of the solution, but when other bodies are present it must be ascertained by chemical processes or by means of the saccharometer. See *Saccharometer*.

Large quantities of sugar from the cane are produced in India, China, and the U. States; but the supply of the European market is chiefly obtained from Java, Cuba, Demerara, Jamaica, and other parts of the West Indies, Brazil, Africa (Egypt), and Australia (Queensland), &c. A like quantity of beet-sugar is supplied chiefly by Germany, Austria, Hungary, France, and Russia. In these countries a bounty used to be paid to the manufacturer for each kilogram of sugar exported; but in 1902 Germany, Austria, Belgium, Spain, France, Britain, Italy, Netherlands, and Sweden agreed to discontinue any direct or indirect bounties for a period of 5 years, after September 1st, 1903. The same countries also agreed to place a tax on sugar imported from countries which gave export bounties. The principal sugar ports in Great Britain are London, Liverpool, Greenock, Leith, and Bristol. The imports of raw sugar from the various countries of production into Britain in 1908 was 940,987 tons; of refined sugar, 734,141 tons. The world's total annual production may amount to 15,000,000 tons. Sugar-refining is a less important industry in Britain than it used to be.

Sugar-cane (*Saccharum officinarum*), a plant of the natural order Gramineæ or grasses, from which great part of the sugar of commerce is obtained. It is nowhere found in a wild state, but is probably a native of tropical Asia. It grows to the height of 7 or 8 feet or more, and has broad ribbed leaves, and smooth shining stems. It is now cultivated in all the warm parts of the globe, such as the West Indies, Brazil, Java, &c., but varies in rapidity of growth according to the situation, the season, or the weather. The sugar-cane flowers only after the lapse of an entire year, and a plantation lasts from six to ten years. The juice of the cane is so palatable and nutritive that dur-

ing the sugar harvest every creature which partakes freely of it appears to derive health and vigour from its use. For the process of making sugar, as well as for other information regarding this product, see the preceding article.

Sugar-mite (*Acarus sacchari*), a species of mite frequently to be observed in raw sugar, very similar in appearance to the itch-mite.

Sugar of Lead, the common name for acetate of lead. See *Lead*.

Suhl (söl), a town of Prussia, prov. of Saxony, 30 miles s.w. of Erfurt. It is a mining centre, and has manufactures of firearms. Pop. 13,600.

Suicide, self-murder; the act of designedly destroying one's own life. To constitute suicide, in a legal sense, the person must be of years of discretion and of sound mind. See *Felo de se*.

Suidæ, the family of mammals of which the hog is the type. This family is characterized by having on each foot two large

clodes the wild boar, the wart-hog, and the peccary.

Suidas, a Greek grammarian, who must have lived about the 11th or 12th century after Christ. He wrote a Lexicon which forms a kind of cyclopædia and dictionary.

Suir, or **SURE**, a river rising in the Slieve-Bloom Mountains, Tipperary, Ireland. It forms the boundary between Tipperary and the counties of Waterford and Kilkenny, and after a course of about 80 miles it flows into Waterford harbour. It passes the towns of Cahir, Clonmel, and Carrick, and is navigable by vessels of 500 tons to Waterford.

Sukkur, a town of Bombay Presidency, India, situated on the right bank of the Indus opposite Rohri. It contains the usual public offices, with a civil hospital, dispensary, and an Anglo-vernacular school. It has a considerable local and transit trade, but no special manufacturing industries. Pop. 31,316.

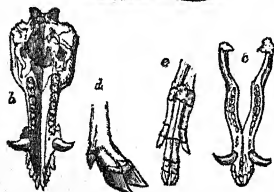
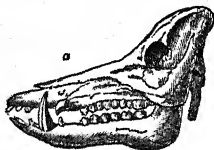
Suleiman Pasha, a Turkish general, born in Constantinople of poor parents in 1840. He entered the army at an early age and rapidly rose to the highest rank. In 1876 he was made general of a division, and on the outbreak of the Russo-Turkish war he had chief command in Herzegovina. In October 1877 he was appointed leader of the army of the Danube, but was recalled in February 1878 and accused of high treason. He was tried and condemned to fifteen years' imprisonment in December of the same year, but was soon afterwards pardoned. He died in Constantinople, 15th April, 1883.

Suliman' Mountains, a range on the borders of Afghanistan and British India. The highest mass, Takht-i-Suliman, or 'Suliman's (Solomon's) Seat', attains an elevation of more than 11,000 feet, having two summits respectively 11,295 and 11,070 feet. These mountains are covered with dense forests, and are generally considered the peculiar seat of the aboriginal Afghans.

Suli'na, the middlemost of the three chief mouths of the Danube; it quits the Khedrile or most southerly branch, and opens into the Black Sea after an easterly course of over 50 miles. (See *Danube*.) It is used for transporting immense quantities of corn, chiefly for the British market. The passage over the bar at the mouth has been deepened by means of dredging and otherwise to about 24 feet. A town and port (now free) at the mouth bears the same name. Pilots,



Sugar-cane (*Saccharum officinarum*).



Characters of Suidæ.

a, Skull of Wild Boar. b, Teeth of the upper jaw. c, Teeth of lower jaw. d, Foot. e, Bones of foot.

principal toes, shod with stout hoofs, and two short lateral toes which hardly touch the earth. The canine teeth project from the mouth and curve upwards. The muzzle is terminated by a truncated snout, fitted for turning up the ground. The family in-

fishermen, lightermen, &c., chiefly form the pop. of 5000.

Suliots, a mixed people of Albanian and Greek origin descended from Arnaout and Grecian shepherds, who, to escape the tyranny of the Turks in the 17th century, settled in the mountains of Parga, south of Albania, where they formed an independent republic. They lived partly by rearing cattle and partly by plunder. Their chief village, Suli, was occupied by the Turks in 1822, and the Suliots then dispersed themselves throughout Greece.

Sulla, **LUCIUS CORNELIUS**, Roman dictator, was born in 138 B.C. He received a good education, but was notorious from his youth upwards for his excessive dissipation and debauchery. He served with distinction under Marius in the Jugurthine (107 B.C.) and Cimbrian (104-102) wars, and in 93 was chosen prætor. For his services in the Social war (90-88) he was appointed consul (B.C. 88), and the province of Asia, with the conduct of the war against Mithridates, fell to his lot. Marius was also ambitious of this command, and resorted to acts of violence to carry his point, by which Sulla was compelled to escape from Rome. But Sulla re-entered the city at the head of his army, drove Marius to Africa, and then sailed for Greece at the beginning of 87 B.C. He expelled the armies of Mithridates from Europe (86), crossed into Asia (84), and was everywhere victorious, gaining plenty of wealth for himself and his soldiers, and forcing Mithridates to conclude a peace. Marius had died in 86 B.C., after proscribing Sulla and confiscating his property, but the party of Marius was still strong. Sulla now hastened to Italy, and landed at Brundisium with 40,000 men B.C. 83. He was joined by many of his friends who had been banished from Rome. He gained four battles over the Roman forces in person, and defeated a Samnite army under Telesinus. He entered the city victorious in 82, and immediately put to death between 6000 and 7000 prisoners of war in the circus. Rome and all the provinces of Italy were filled with the most revolting scenes of cruelty. After satisfying his vengeance by the murder or proscription of thousands he caused himself to be named dictator for an indefinite period (B.C. 81). He now ruled without restraint, repealed and made laws, abolished the tribuneship, and settled his veterans in various parts of Italy. In 79 B.C. he laid down his dictatorship, and retiring to Pu-

teoli abandoned himself to all sorts of debauchery. He died in 78 B.C. See *Rome*.

Sullivan, **SIR ARTHUR SEYMOUR**, born in London in 1842, son of a musician. He became a choir-boy at the Chapel Royal, and in 1856 he gained the Mendelssohn scholarship of the Royal Academy of Music. In 1858 he went to Leipzig, returning in 1861. Next year he attracted attention by his music to Shakspeare's *Tempest*. He afterwards wrote oratorios (*Prodigal Son*, *Light of the World*), cantatas, overtures, incidental music to plays (Shakspeare's, Tennyson's), orchestral compositions, anthems, songs, &c.; but his most popular compositions are the famous comic operas produced in conjunction with W. S. Gilbert. Among the most popular of these are *H.M.S. Pinafore* (1878), *Pirates of Penzance* (1880), *Patience* (1881), *Iolanthe* (1882), *Mikado* (1885), the *Yeomen of the Guard* (1888), and the *Gondoliers* (1889). His arrangement of Longfellow's *Golden Legend* (1886) is one of his finest compositions. His *Ivanhoe* (1891) was an able serious opera. He was Mus.D. of Cambridge and Oxford, and was knighted in 1883. He died in 1900.

Sully, **MAXIMILIEN DE BÉTHUNE**, **DUC DE**, Marshal of France and first minister of Henry IV., was born in 1560, and educated in the Protestant (Calvinistic) faith. He distinguished himself at the battle of Ivry in 1590, where he was severely wounded, and was afterwards of great assistance to the king in resisting the intrigues of the League. In 1597 he was appointed controller of finance, and by his excellent administration largely reduced taxation, and eventually paid off a state debt of 300,000,000 livres. He also received many other offices and dignities, and became adviser of the king in all his councils. His industry was unwearied, and he did all he could to encourage agriculture, which he regarded as the mainstay of the state. In 1606 the territory of Sully-sur-Loire was erected into a duchy in his favour. After the murder of Henry IV. (1611) he retired from court and resigned most of his charges. He now occupied himself chiefly with agriculture, and rarely took part in political affairs. He was created a marshal by Richelieu in 1634, and died in 1641. He left memoirs which have been published in English.

Sulmo'na, or **SOLMO'NA** (ancient, *Sulmo*), a town of Central Italy, prov. Aquila, 38 miles south-east of Aquila. It has a cathedral and numerous churches, and manufactures.

of paper and confectionery. The poet Ovid was born here. Pop. 12,000.

Sulphates, the salts of sulphuric acid. Sulphuric acid is a dibasic acid, and gives rise to two distinct series of salts, viz. the *normal* or *neutral* sulphates, in which the whole of the hydrogen of the acid is replaced by metallic radicles, e.g. Na_2SO_4 and ZnSO_4 ; and *acid* sulphates (or bisulphates), in which only part of the hydrogen of the acid has become replaced, e.g. KHSO_4 and NaHSO_4 . Most of the sulphates are readily soluble in water. Gypsum, or calcic sulphate, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$, is sparingly soluble, and barium and lead sulphates are insoluble. Some of the commoner sulphates are: Alum, or double sulphate of aluminium and potassium; ammonium sulphate, obtained in gas-works, and used as a source from which other ammonium compounds are prepared; blue-vitriol, or cupric sulphate, $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$, used in surgery, in dyeing, and for preparing green pigments; green vitriol, or ferrous sulphate, $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$, used for making ink, and in dyeing and calico-printing; Epsom salts, $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$; Glauber's salts, $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$; white vitriol, $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$, used in surgery, also in the preparation of drying oils for varnishes, and in the reserve or resist pastes of the calico-printer; quinine sulphate, used in medicine; and mercuric sulphate, HgSO_4 . Numerous double sulphates besides alum are known.

Sulphides, binary compounds of sulphur with other elements.

Sulphites, salts of sulphurous acid. The sulphites are recognized by giving off the suffocating smell of sulphurous acid when acted on by a stronger acid. A very close analogy exists between them and the carbonates. See *Sulphur*.

Sulphur, an elementary, non-metallic, combustible substance which has been known from the earliest ages; chemical symbol, S. It occurs native in a pure state in beds of gypsum or clay in Sicily, Mexico, and New Zealand, and also in fissures in the rocks of volcanic districts. It also occurs united with metals in the form of sulphides, the commonest of which are iron pyrites, FeS_2 ; galena, PbS ; zinc blende, ZnS_2 , and copper pyrites. Combined with metals and oxygen it forms the metallic sulphates, of which those of barium, calcium, strontium, and magnesium are the commonest. It occurs in small amounts in a state of combination in many animal

tissues and in a few plants. Practically all native sulphur is derived from volcanic districts, such as those of Sicily. The sulphur manufactured in Britain is obtained by roasting iron pyrites; the condensed mass of sulphur thus obtained is broken into lumps and distilled. Native sulphur is usually separated from the earthy matter by a process of distillation. The product obtained from native sulphur, or from iron pyrites, is afterwards refined by redistillation. It is nearly tasteless, has a greenish-yellow colour, and when rubbed or melted emits a peculiar odour. Its atomic weight is 32.06, and its specific gravity 1.99. It is insoluble in water, only sparingly soluble in alcohol, but dissolves readily in spirits of turpentine, many oils, and carbon disulphide. It is a non-conductor of electricity, and melts at 115°C . to a pale amber-coloured liquid. As the temperature is raised the colour deepens, and the liquid becomes less limpid, until at $200\text{--}250^\circ \text{C}$. it forms a thick viscid mass of a dark-red colour. If this be poured into water a red plastic amorphous form of sulphur is obtained. Above $250\text{--}300^\circ$ the liquid becomes thinner, and begins to boil at 440° . When just molten it may be run into cylindrical moulds, and thus forms the *brimstone* or roll-sulphur of commerce. If distilled and the vapour rapidly cooled by means of a brickwork surface, it forms the fine powder known as *flowers of sulphur*. Sulphur exists in two distinct crystalline forms, and also as an amorphous variety; these modifications are characterized by differences in specific gravity, in solubility in various liquids, and in many other points. It is employed in the manufacture of gunpowder, matches, vulcanite, and sulphurous and sulphuric acids. It is also employed in medicine, and for various other purposes. *Sulphur chloride* (S_2Cl_2) is produced by passing chlorine gas into a retort containing melted sulphur. It is used for vulcanizing caoutchouc. Sulphur forms two compounds with oxygen, the *dioxide* (SO_2) and the *trioxide* (SO_3). For former see *Sulphurous Oxide*. Sulphur trioxide is a white crystalline solid, produced by the combination of the dioxide with oxygen. *Sodium thiosulphate* ($\text{Na}_2\text{S}_2\text{O}_3$) is produced by boiling sulphur with soda lye, and passing sulphur dioxide into the solution until it is completely decolorized. It is largely used in the arts as an antichlor, and for fixing photographs. Carbon disulphide

SULPHURETTED HYDROGEN — SULPHURIC ETHER.

(CS₂) is a volatile liquid, with a poisonous vapour, produced by the action of sulphur upon carbon at high temperatures. It is used for dissolving caoutchouc and gutta-percha, for extracting essential oils, spices, &c., from plants and seeds, and bitumen from minerals, &c. A considerable amount of sulphur is now obtained from alkali waste (see *Soda*) by Chance's or some other process. For other compounds see *Sulphuretted Hydrogen, Sulphuric Acid*.

Sulphuretted Hydrogen, or HYDROGEN SULPHIDE (H₂S), a compound formed when sulphur is burnt in hydrogen gas. It is a transparent colourless gas, recognized by its peculiar fetid odour, resembling that of putrid eggs. It is very deleterious to animal life, and is often formed where animal matters or excrements putrefy. It is the active constituent of sulphur mineral waters, and occurs to a certain extent in the gases issuing from volcanoes. It is usually prepared by decomposing a metallic sulphide, especially sulphide of iron or of antimony, by means of hydrochloric or sulphuric acid. Sulphuretted hydrogen is of great use in the laboratory, in qualitative analysis.

Sulphuric Acid, or OIL OF VITRIOL, a most important acid discovered by Basil Valentine towards the close of the 15th century. It was formerly procured by the distillation of dried sulphate of iron, called *green vitriol*, whence the corrosive liquid which came over in the distillation, having an oily consistence, was called *oil of vitriol*. The basis of the ordinary English method of manufacturing sulphuric acid was laid down by Roebuck in 1746. The method consists in burning sulphur, or more frequently iron pyrites, in closed furnaces, and leading the fumes, mixed with oxides of nitrogen, into large leaden chambers, into which jets of steam are continuously sent. The oxides of nitrogen are produced by the action of sulphuric acid upon nitre contained in pots, which are placed between the sulphur ovens and the chambers. The sulphur dioxide takes away part of the oxygen from the oxides of nitrogen, which are again oxidized by the air in the chambers. The sulphur trioxide produced unites with the steam to form sulphuric acid. The acid produced in the chamber, and known as chamber acid, is condensed in leaden vessels until it reaches a certain gravity (about 1·72), when it is run into glass, or sometimes platinum vessels, where the conden-

sation is continued until the specific gravity has increased to 1·84. The acid of gravity 1·72 constitutes the *brown* acid of commerce; it is largely used in the manufacture of superphosphate of lime and for other purposes. On the Continent the acid is now manufactured from sulphur trioxide and water, the sulphur trioxide, SO₃, being manufactured by passing a mixture of sulphur dioxide and oxygen over a small amount of platinized asbestos at 450° C. Pure sulphuric acid is a dense, oily, colourless fluid, exceedingly acid and corrosive, decomposing all animal and vegetable substances at a high temperature. It is a strong hygroscopic substance, readily abstracting moisture from the air, and is thus often used as a drying reagent, especially for gases. It mixes with water in all proportions, and considerable rise in temperature occurs. The salts of acids less volatile than sulphuric acid are all decomposed by oil of vitriol, and this is the basis of the methods used for the preparation of hydrochloric, nitric, and hydrofluoric acids, &c. Its uses in the arts and for scientific purposes are innumerable. Its salts are known as *sulphates* (see article). By concentrating sulphuric acid as far as is possible without decomposition, and cooling the liquid so obtained, crystals of the true acid, H₂SO₄, are formed. The ordinary acid contains water and other impurities; it may be purified by distillation with a small amount of common salt and neglecting the first portion which distils over. *Nordhausen sulphuric acid* is obtained by dissolving sulphur trioxide in the ordinary acid, and contains the compound *pyro-sulphuric acid*, H₂S₂O₇. It is more active than the common acid, and is used for dissolving indigo, &c.

Sulphuric Ether, ethyl ether, or ordinary ether, (C₂H₅)₂O, is a colourless, transparent liquid, with a pleasant smell and a pungent taste, extremely exhilarating, and producing a degree of intoxication when its vapour is inhaled by the nostrils. It is usually prepared by distilling a mixture of equal weights of concentrated sulphuric acid and ethyl alcohol. Its specific gravity is 0·720. It is extremely volatile and highly inflammable; and its vapour, mixed with oxygen or atmospheric air, forms a very dangerous explosive mixture. It dissolves in 10 parts of water, and is miscible with alcohol and the fatty and volatile oils in all proportions. It is employed in

SULPHUROUS OXIDE—SUMATRA.

medicine as a stimulant and antispasmodic. Ether, by its spontaneous evaporation, produces a considerable lowering of temperature, and is used in the form of spray in minor surgical operations for freezing the part, and thus rendering it insensible to pain. True sulphuric ether, known also as *ethyl sulphate*, $(C_2H_5)_2SO_4$, is an oily liquid of burning taste and ethereal odour, resembling that of peppermint. It is almost incapable of being distilled without decomposition, as at a temperature of about 280° it decomposes into alcohol, sulphur dioxide, and olefant gas.

Sulphurous Oxide, or **SULPHUR DIOXIDE**, SO_2 , a gas formed by the combustion of sulphur in air or dry oxygen. It is colourless, has a pungent, suffocating odour, a disagreeable taste, and is readily soluble in water. It is fatal to life and injurious to vegetation. It can be readily liquefied at the ordinary temperature by a pressure of two atmospheres, and the liquid is now placed on the market in glass syphons. The oxide extinguishes flame, but is not itself inflammable. It has considerable bleaching properties, so that the fumes of burning sulphur are often used to whiten straw, silk, and cotton goods. The aqueous solution of the gas is known as *sulphurous acid* (H_2SO_3). This acid readily takes up oxygen, passing into sulphuric acid; it is dibasic, forming salts called sulphites.

Sulpicians, a Roman Catholic congregation of missionary priests founded in 1642 at Paris by the Abbé Ollier. They have a number of houses in Europe and America, and are chiefly engaged in training young men for the priesthood. They are called Sulpicians from the parish of St. Sulpice, where the congregation was first organized.

Sultan, in Arabic, signifies 'mighty one, lord.' It is the ordinary title of Mohammedan rulers. The ruler of Turkey assumes the title of *Sultan-es-selatin*, 'Sultan of sultans.' The title sultan is also applied to the sultan's daughters, and his mother, if living, is styled *Sultan Valide*.

Sultanpur, a district of India, in Oudh; area, 1700 square miles. Chief river, the Gumti. P. 1,084,115.—The town **SULTANPUR**, administrative head-quarters of the district, contains the usual public buildings, and has a population of 9000.

Sulu, or **SOOLOO ISLANDS**, a group in the Indian Archipelago, consisting of more than 150 islands, which stretch from the N.E. point of Borneo to the Philippine Islands; total

estimated area, 1600 square miles. Sulu, the chief island, is lofty, and lies near the centre of the group. The islands are of volcanic origin, and produce all kinds of tropical plants and trees. They are well watered, and enjoy an immunity from the hurricanes which ravage the neighbouring islands. The inhabitants are of Malay descent, and nearly all profess the Mohammedan religion. There is a considerable trade between Sulu and Singapore in bêche-de-mer, pearl shells, birds'-nests, &c. The Sulu Islands, with the Philippines, now belong to the United States of America. Pop. 51,389.

Sumach (sū'mak; *Rhus*), a genus of shrubs of the natural order Anacardiaceæ, with pinnate leaves and small flowers. They all have a lactescent acrid juice, and most of them possess valuable tanning properties. More than seventy species are known. *R. coriaria* is found in the countries about the Mediterranean. Its roots contain a brown, and its bark a yellow dye. The leaves and seeds are used in medicine as astringent and styptic, and the leaves are exported for use in tanning, dyeing, and calico-printing. *R. typhina* is an American species with hairy branches, hence its common name of stag's-horn sumach. It produces small red berries, and is cultivated in European gardens for ornament. *R. glabra*, another American species, is also grown for ornament, and its berries and branches are used for dyeing purposes. *R. venerated*, commonly called dog-wood or poison sumach, is a shrub of the American swamps. It grows from 12 to 20 feet high, and produces greenish-white flowers. It is extremely poisonous, in some cases giving rise to inflammation of the skin followed by a pustular eruption. *R. radicans*, often called poison ivy, is a climbing variety. It affects certain individuals in the same manner as the poison sumach, but it is less virulent. The leaves of several of these species are now extensively collected in America for tanning or other purposes. The celebrated Japan varnish is obtained from a species of *Rhus* with downy and velvety leaves. The varnish oozes from the tree when wounded, and grows thick and black when exposed to the air. For currier's sumach see *Coriaria*.

Sumatra, a great island in the Indian Seas immediately under the equator, separated from the peninsula of Malacca by the Straits of Malacca and from Java by the Straits of Sunda. Greatest length, about

1000 miles; breadth, about 240 miles; area, about 150,000 square miles. Banca and other islands adjoin the coast. The west side of the island is mountainous, with peaks ranging in height from 2000 feet in the south to 5000 feet further north; and culminating in Indrapura, a volcano 12,572 feet high. The east side spreads out into interminable level plains. There are several volcanoes in the island. Copper, tin, and iron are found; coal and much petroleum are obtained. The chief rivers are the Rokan, Musi, Jambi, and Indragiri, which all form extensive deltas at their mouths. Sumatra enjoys great equability of climate, but in many low-lying parts is unhealthy; rain falls almost incessantly in the south. Mangroves grow near the coast, and at higher elevations myrtles, palms, figs, and oaks of various species are met with. The camphor-tree prevails in the north, and among vegetable curiosities are the upas-tree and the gigantic *Rafflesia*. Pepper, rice, sugar, tobacco, indigo, cotton, coffee, are cultivated for export, and camphor, benzoin, catechu, gutta-percha and caoutchouc, teak, ebony, and sandal-wood are also exported. The fauna includes the elephant, the tapir, the two-horned rhinoceros, the tiger, the orang-outang and other apes, some species of deer and antelope, and numerous birds and reptiles. Of the domestic animals the chief is the pig, next to which rank the cow and the horse. The island is all nominally under the authority of the Dutch, who have divided it into six administrative divisions. The most important native state is Acheen (which see), in the extreme north of the island. Sumatra has a very mixed population, consisting of Malays, Chinese, Arabs, and many native tribes. The Battas are a peculiar and interesting race, approaching the Caucasian type. Writing has been known amongst them from a very early period, and their ancient books are written in a brilliant ink on paper made of bark. The native tribes of Sumatra have no temples and no priests, but a form of Mohammedanism prevails amongst the Malays on the coast. The chief towns are Palembang and Padang. Total pop. estimated at between 3,000,000 and 4,000,000. Railways have recently been introduced. The Dutch acquired their territories in Sumatra in the 16th and 17th centuries. The British formed a settlement at Bencoolen in 1685, and in 1811 seized the Dutch possessions on the island. These were restored in 1815, and by treaties in 1834

and 1871 the Dutch were allowed the right to enlarge their territories by treaty, or by conquest and annexation. The tidal wave accompanying the volcanic eruption of Krakatoa in 1883 caused great destruction on the south coast of Sumatra.

Sumba, same as *Sandalwood Island* (which see).

Sumbal, or SUMBUL, an Eastern name for the root of an umbelliferous plant, *Euryangium sumbul*. It contains a strongly odorous principle, like that of musk, and is regarded as an antispasmodic and stimulating tonic. Also an Eastern (Arabic) name of spikenard (which see).

Sumba'wa, an island of the Indian Archipelago, lying south by west of Celebes, between Lombok and Flores, about 160 miles long from east to west, with a breadth varying from 13 to 31 miles. It is divided into several native states, governed by rajahs, all tributary to the Dutch. The soil is mostly volcanic, and very fertile, cotton, rice, tobacco, &c., being grown, besides the usual tropical fruits. Sumbawa is mountainous, and in the north is the volcano Temboro, 7600 feet high, of which an eruption in 1815 caused the loss of 12,000 lives. The inhabitants are of Malay race and Mohammedans. Pop. about 150,000.

Sumbul. See *Sumbal*.

Sumerians, a name equivalent to Accadians. See *Accadians* and *Assyria*.

Summary Proceeding, in law, said of a form of trial in which the ancient established course of legal proceedings is disregarded, especially in the matter of trial by jury. In no case can a party be tried summarily unless when such proceedings are authorized by legislative authority, as in a committal for contempt of court, the conviction of a person by justices of the peace, &c.

Summer, the season of the year which in the northern hemisphere generally may be said to comprise the months of June, July, and August. The astronomical summer lasts in the northern hemisphere from the June solstice to the September equinox, during which time the sun, being north of the equator, shines more directly upon this part of the earth, and rises much sooner and sets later, which renders this the hottest



Sumbul (*Euryangium sumbul*).

period of the year. The period of greatest heat generally takes place in August, since the influence of the sun's rays has then been felt for a long time on the earth, and the wind blowing from the north becomes milder owing to a moderation of the temperature in the polar circle caused by the thawing of the ice. In the southern hemisphere the summer lasts from the December solstice to the March equinox. See *Seasons*.

Summer-duck (*Aix Sponsa*), a species of duck, allied to the mandarin duck or Chinese teal (*Aix galericulata*), and distinguished as a genus by a short bill, with a large horny tip and straight edges, and by the hinder toe being unconnected to the other digits. These birds inhabit North America, and usually build their nests in the hollows and trunks of trees. The summer-duck has been found capable of domestication.

Summons, in law, a writ addressed to the defendant in a personal action, admonishing him to appear in court. It must contain the names of all the defendants, the name and address of the person taking it out, and the date of issue; but it need not state the form or cause of action. When issued against persons residing in England, Scotland, or Ireland, it is in force for six months; but in the case of a British subject residing abroad, the time is regulated according to the distance of his domicile from England. A summons should be served on the defendant in person; but if reasonable efforts are made to do this, and the defendant is aware of its issue, the judge may authorize the plaintiff to proceed in the action without personal service. The law of Scotland requires a summons to contain the grounds and conclusions of the action. It is issued from the Court of Session in the sovereign's name, but in an inferior court it is issued in the name of the judge or magistrate presiding over that court.

Sumner, CHARLES, an American jurist and statesman, born at Boston, Massachusetts, January 6, 1811, and educated at Harvard University. In 1834 he was called to the bar, and shortly afterwards became reporter of the United States Circuit Court. In 1836 he published three volumes of Judge Story's decisions, subsequently known as Sumner's Reports, and edited a periodical called the American Jurist. He visited Europe in 1837, and returned to Boston in 1840, where he resumed his legal practice. Between 1844 and 1846 he edited and published Vesey's Reports, in twenty volumes.

In 1851 he was elected to the senate of the United States, and distinguished himself by his strong antipathy to slavery. In May 1856, after delivering a speech vigorously attacking the slaveholders, he was violently assaulted by P. S. Brooks, a member representing a slaveholding state (South Carolina). His injuries compelled him to absent himself from public duties for nearly four years. He was a supporter of Lincoln and Hamlin, and in 1861 he became chairman of the senate committee on foreign relations. He was an enemy to the policy of President Johnson, and opposed the home and foreign policy of President Grant. After the latter's re-election in 1872 Sumner seldom appeared in debate. He died at Washington, March 11, 1874.

Sumner, JOHN BIRD, D.D., Archbishop of Canterbury, son of a clergyman, was born at Kenilworth, Warwickshire, in 1780, and educated at Eton and Cambridge, where he took high honours. He entered the church, and became rector of Mapledurham. In 1820 he was made canon of Durham, in 1828 bishop of Chester, and in 1848 archbishop of Canterbury. He died in London in 1862. His works include *The Evidences of Christianity* (1824), *Lectures on the Gospels and Epistles* (1831-40), and *Practical Reflections* (1859).

Sumptuary Laws, such as are intended to repress extravagance, especially in eating and drinking, and in dress. They were common in ancient times, and also appear in the old statute-books of most modern nations. They were more frequently enacted in ancient Rome than in Greece. After the Twelve Tables, the first Roman sumptuary law was the *Lex Oppia* (215 B.C.), directed exclusively against female extravagance in dress, jewellery, &c. The other Roman laws of this kind were nearly all designed to suppress extravagance in entertainments. The *Lex Julia*, the last sumptuary law, was passed in the reign of Augustus. Sumptuary laws were revived by Charlemagne, and in France various laws and decrees of a similar nature were passed down to the reign of Louis XV. In England these laws were passed from the reign of Edward III. down to the time of the Reformation. Most of them were repealed by 1 James I. cap. xxv., but they were not all expunged from the statute-book till 1856. Sumptuary laws were also passed by the ancient Scottish legislature, but they were all repealed, evaded, or neglected. Such laws furnish

modern historians with valuable evidence of the manners and customs of different nations in past ages. They are, however, altogether foreign to the spirit of modern legislation, and contrary to the most elementary principles of political economy.

Sumter, Fort. See *Fort Sumpter*.

Sunny. See *Soumy*.

Sun, the central orb of the solar system, that around which revolve the earth and the other planets. The sun appears to be a perfect sphere, with a diameter of 866,900 miles; its mean density is about $\frac{1}{4}$, taking that of the earth as 1; its mean distance from the earth is taken as 92,500,000 miles. It rotates on its own axis, this axis of rotation being inclined to the ecliptic at an angle of $82^{\circ} 40'$; and its rotation period is variously estimated at from twenty-five to twenty-eight days. The mass of the sun is about 750 times that of all the other members of the solar system combined, and the centre of gravity of the solar system lies somewhere in the sun, whatever may be the relative positions of the planets in their orbits. The dark spots on the sun discovered by Galileo have been thought to be hollows, and their depth has been estimated at from 3000 to 10,000 miles. The spots are very changeable in their figure and dimensions, and vary in size from mere points to spaces of 50,000 miles or more in diameter. It is from observations of these spots that the sun's rotation on its axis has been calculated. The frequency of sun spots attains a maximum about every eleven years, the number of spots falling off during the interval to a minimum, from which it recovers gradually to the next maximum. This periodicity has been thought to be intimately connected with the meteorological phenomena observed on the earth, especially with auroral and magnetic phenomena and with the rainfall (but this last is more doubtful). Spots are called *maculae*, brighter portions of the sun are called *faculae*, and the lesser markings are called *mottlings*. The sun is now generally believed to be of gaseous constitution, covered with a sort of luminous shell of cloud formed by the precipitation of the vapours which are cooled by external radiation. This dazzling shell is termed the *photosphere*. The spots may be cavities in this cloud-layer. Zöllner, who considers the body of the sun to be liquid, sees in them slags or scorix floating on a molten surface, and surrounded by clouds. But the nature of the photosphere

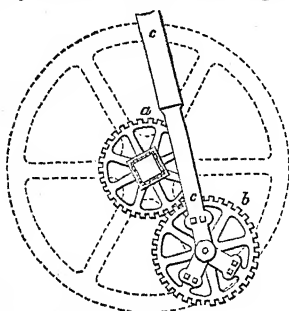
is not clear, though it may be regarded as the actual surface of the luminary. It is estimated that the sun's radiation would melt a shell of ice covering its own surface to a depth of between 39 and 40 feet in one minute. The amount of heat has also been computed as equivalent to the combustion on every square foot of the sun's surface of upwards of $13\frac{1}{2}$ cwts. of coal per hour. According to some this expenditure of heat is kept up by the passing of portions of the sun from the gaseous into the solid or liquid state, with a corresponding shrinkage in bulk. But the recent discovery of radium and helium and their mutual relations lead to suggestions of the loss of heat being otherwise supplied. The spectroscope has enabled us to detect many of the known elements as entering into the composition of the sun, including the following substances:—Non-metallic: carbon, silicon, hydrogen, oxygen (?); metallic: iron, silver, tin, zinc, lead, titanium, calcium, manganese, nickel, cobalt, chromium, barium, sodium, magnesium, copper, sulphur, cerium, strontium, and potassium. In 1706 Captain Stannyan observed a blood-red streak just before the limb of the sun appeared after a total eclipse, and such appearances were subsequently observed, being first scientifically described in 1812 under the names of flames, protuberances, or prominences. In 1868 the spectroscope showed that these appearances were due to enormous masses of glowing hydrogen gas floating above the sun, similarly to clouds in our atmosphere. The region outside the photosphere in which these coloured prominences are observed has been called the *chromosphere*, which has an average depth of from 3000 to 8000 miles. The incandescent hydrogen clouds stretch out beyond this to altitudes of 20,000 to 100,000 miles, and jets of chromospheric hydrogen have been observed to reach a height of 200,000 miles in twenty minutes, and disappear altogether within half an hour. Outside the chromosphere is the *corona*, an aurora of light observed during total eclipses, and now forming the chief object to be observed by eclipse expeditions. This phenomenon has been shown to be connected with the existence of what is called the 'coronal atmosphere', but the nature of this atmosphere is as yet undetermined.

Sun, WORSHIP OF THE. Sun worship probably prevailed in the earliest times among all nations, and the chief deities of the poly-

SUN AND PLANET WHEELS—SUNDAY-SCHOOLS.

theisms of ancient India, Egypt, Greece, Rome, Germany (Indra, Amoun Ra, Zeus, Jupiter, Odin, &c.), are, according to a popular theory, all identified as sun gods. But by some people the sun itself was worshipped as a physical object associated with fire, as among the followers of Zoroaster, the ancient Celts, &c. Peru seems to have had the most complete system of sun worship.

Sun and Planet Wheels, an ingenious contrivance adopted by Watt in the early history of the steam-engine, for converting the reciprocating motion of the beam into a rotatory motion. In the annexed figure the



Sun and Planet Wheels.

sun wheel *a*, is a toothed wheel fixed fast to the axis of the fly-wheel, and the planet wheel *b* is a similar wheel bolted to the lower end of the connecting-rod *c*; it is retained in its orbit by a link at the back of both wheels. By the reciprocating motion of the connecting-rod the wheel *b* is compelled to circulate round the wheel *a*, and in so doing carries the latter along with it, communicating to the fly-wheel a velocity double of its own.

SUNART, LOCH, an inlet in Scotland, in the west of Argyshire, opening into the Sound of Mull. It is about 20 miles long, and varies in breadth from less than $\frac{1}{2}$ mile to 3 miles.

Sun-bear (*Helarctos*), a sub-genus of the genus *Ursus*, comprising bears found in India and the Eastern Archipelago. The Thibetan sun-bear (*H. thibetanus*) is a black species with a white patch on the breast. The Bornean sun-bear (*H. euryspilus*) has an orange-coloured patch. The Malayan sun-bear or bruang is a very small species. (See *Bear*.) All the sun-bears are slenderly made, and their fur is not so heavy and thick as that of the other bears.

Sun-bird, the name given to a family (Nectariniidae) of tenuirostral insectivorous birds, which are confined to the tropical regions of Africa and Asia, and in brilliant plumage and habits resemble the humming-birds. They live on insects and the juices of flowers; their nature is lively and their song agreeable. They build in the hollows of trees or in thick bushes. Some species (such as *Nectarinia Lotenia* and *N. Asiatica*) make dome-like nests, which they suspend at the extremities of twigs or branches.

Sunbury, an old market-town of England, in Middlesex, on the Thames, about 16 miles S.W. of London. Pop. 4544.

Sunda, STRAIT OF, between the islands of Sumatra and Java, and connecting the China Sea and the Indian Ocean. It is 100 miles long by about 20 miles wide at the narrowest part. See *Krakatoa*.

Sunda Islands, a group of islands in the Indian Archipelago; composed of the Great Sunda Islands, namely, Sumatra, Borneo, Celebes, Java, Madura, Banca, and Billiton; and of the Lesser Sunda Islands, namely, Bali, Lombok, Sumbawa, Flores, Sandalwood Island or Sumba, Ombai, the Timor group, &c.

Sunday (that is, day of the sun, like Monday, day of the moon), the first day of the week, the Lord's day. See *Sabbath*.

Sunday-letter. See *Dominical Letter*.

Sunday-schools, schools held on Sunday for the purpose of imparting religious instruction to the young by means of reading and repetition in the Bible, catechism, hymns, &c. In 1527 Martin Luther established several Sunday-schools in Germany for the instruction of children and youths in reading the Holy Scriptures, and in the latter half of the same century Cardinal Borromeo organized similar schools throughout Milan. The modern Sunday-schools, however, as an institution, were founded in England by Robert Raikes, editor of the Gloucester Journal, in 1781, who, in order to prevent the profanation of the Sabbath by the children of the poorer classes, engaged several women to instruct such children as he should send to them on Sundays in reading and the catechism, paying each of them a shilling for her day's work. His example was soon followed by other charitable persons, and in 1785 a society was formed for the encouragement of Sunday-schools by pecuniary aid, &c. Gratuitous instruction became general about 1800, and in 1803 the first Sunday-school union was

formed in London. Similar unions were quickly established in many large towns and in some of the counties. The Scottish Sabbath-schools (first established in Edinburgh in 1787) arose from the English Sunday-schools, and so universal has the establishment of Sunday-schools now become in the British Isles that one exists in connection with nearly every church. In America the first Sunday-schools were opened at New York in 1816, and have since multiplied rapidly and overspread the whole country. By 1815 such schools had been introduced into most European countries, but do not appear to flourish so well among foreign nations as in English-speaking countries.

Sunderbunds, or **SUNDARBANS**, a vast tract of forest and swamp forming the southernmost portion of the Gangetic Delta, at the head of the Bay of Bengal; extreme length along the coast, about 165 miles; greatest breadth, 81 miles; and area, 7532 square miles. The country is one vast alluvial plain where the continual process of land-making has not yet ceased. It abounds in morasses and swamps, now gradually filling up, and is intersected by large rivers and estuaries running from north to south. There is a reclaimed tract along the northern border devoted to the cultivation of rice. The unreclaimed portion near the sea consists of impenetrable jungle and thick underwood traversed by gloomy-looking water-courses. The Sunderbunds abound in wild animals, including numerous tigers, leopards, rhinoceros, buffaloes, deer, monkeys, &c. Fish are plentiful, and the python, cobra, and other snakes, together with every description of birds and water-fowls, are found.

Sunderland, a seaport, mun., county, and parliamentary borough of England, at the mouth of the Wear, county of Durham, 13 miles N.E. of Durham, and 12 miles S.E. of Newcastle. It is the largest town of Durham, and includes nearly the whole of three parishes—Sunderland, Bishopwearmouth, and Monkwearmouth. The town is for the most part new and well built. It has parks, a museum, a free library, a school of art, &c. The principal buildings include St. Peter's, an ancient parish church on the site of the monastery in which the Venerable Bede was educated, many other churches and chapels, two theatres, &c. The river is crossed by the famous cast-iron bridge of one arch (236 feet span), built in 1793, and since reconstructed and strengthened. The

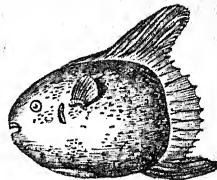
harbour with its docks covers 78 acres, and its entrance is formed by two stone piers with lighthouses; there being two outer piers inclosing a harbour of refuge. The staple trade interests of the place are shipping, the coal trade, and shipbuilding, and there are also large factories for the making of marine engines, iron work, bottles, glass, earthenware, rope, &c. Coal is the chief export; the imports are chiefly timber and grain, with various raw materials and provisions, from the Baltic ports, Holland, &c. Pop. of par. bor. (which returns two members), 158,877; co. bor., 146,077.

Sun-dew (*Drosera*; nat. order Droseraceæ), plants growing in bogs and marshes, having leaves clothed with reddish hairs bearing glands which exude drops of clear glutinous fluid, glittering like dew-drops, whence the name. The three British species are *D. rotundifolia*, *intermedia*, and *anglica*, differing chiefly in the shape of the leaves. A characteristic of these plants is their habit of capturing insects by their viscid secretion. Mr. Darwin, in his *Insectivorous Plants* (1875), says that the sun-dew derives its nitrogenous food by absorption from the tissues of insects entangled in the inflected tentacles of its viscid leaves; while like other plants it obtains and assimilates carbonic acid from the air. He further shows that these leaves have the power of digestion, and that they act on albuminous compounds in the same manner as does the gastric juice of higher animals, the digested matter being afterwards absorbed. The digestive faculty has also been traced in the butterwort, the pitcher-plant, &c. See the article *Carnivorous Plants*.

Sun-dial. See *Dial*.

Sundsvall, a seaport of Sweden, on the Gulf of Bothnia, near the mouth of the Indalselv, with important exports of timber and iron. Pop. 15,872.

Sun-fish (*Orthogoriscus*), a remarkable genus of fishes belonging to the order Teleostei, sub-order Plectognathi. These fishes are short and almost circular in form, their jaws are undivided, and they have no swimming-bladder. The sun-fish appears like the head of a large fish



Short Sun-fish (*Orthogoriscus molai*).

separated from its body, and when swimming it turns upon itself like a wheel. It grows to a large size, often attaining a diameter of 4 feet, and sometimes even that of 12 feet. The skin is hard and leathery, but the flesh is soft, white, and palatable. The liver is large, and yields an oil highly valued amongst sailors as a cure for rheumatism. The sun-fish is found in all seas from the antarctic to the arctic circle. The two most familiar species are *O. mola* and *O. oblongus*.

Sun-flower (*Helianthus*), natural order Compositæ, a genus of plants, so called from the ideal resemblance of the yellow flowers to the sun with his golden rays. The root is mostly perennial; the stem herbaceous, upright, and often tall; the leaves opposite or alternate, undivided, often rigid and scabrous; the flowers large and terminal, usually disposed in a corymb. The species are numerous, and mostly inhabit North America. The gigantic sun-flower (*H. annuus*), common in gardens, is a native of Peru. The stem is from 6 to 15 feet in height; the flowers, sometimes 1 foot in diameter, are usually turned towards the south. The seeds form an excellent nourishment for poultry and for cage birds; and an edible oil has also been expressed from them. For the *Helianthus tuberosus*, or Jerusalem artichoke, see *Artichoke*.

Sunn, **SUNN-HEMP**, a material similar to hemp, imported from the East Indies, and extensively used in the manufacture of cordage, canvas, &c. It is obtained from the stem of the *Crotalaria juncea*, a shrubby leguminous plant 8 to 12 feet high, with a branching stem, lance-shaped silvery leaves, and long racemes of bright yellow flowers. Called also *Bombay Hemp*, *Madras Hemp*.

Sunna. See next article.

Sunnites, the so-called orthodox Mohammedans, in contradistinction to the Shiites or heterodox Mohammedans. They form by far the larger of the two divisions, embracing the Mohammedan inhabitants of Egypt and the rest of Africa, Syria, Turkey in Europe and Asia, Arabia, &c. They chiefly differ from the Shiites in receiving the Sunna (a collection of traditions relating to Mohammedanism) as of equal importance with the Koran, while the Shiites reject it absolutely. There are several diversities in the copies of the Sunna, and the Sunnites are subdivided, on account of some minute differences of custom and law, into four minor sects. The Persians are the principal Shiites.

Sun-stroke, any sudden and severe injury to the health resulting from the exposure of the head to a hot sun. The most usual symptoms of sun-stroke are the following:—Pains in the head, accompanied by fever; lethargy, or suffering which prevents sleep; congestion of the brain or other nerve-centres, or an inflammation of the brain sometimes ensues, and often terminates fatally. Sometimes the effects of the stroke can be discerned only in impaired bodily health or mental vigour dating from some occasion on which the patient was exposed to a violent sun.

Supercargo, a person charged with the accounts and disposal of the cargo, and with other commercial affairs in the merchant ship in which he sails as agent for the owner of the cargo.

Supererogation, **WORKS OF**, in the Roman Catholic Church, the name for a class of good works which are considered to be not absolutely required of each individual as conditions to salvation. Such good deeds, it is believed, God may accept in atonement for the defective service of another.

Superfoetation, a second conception after a prior one, and before the birth of the first child, by which two fetuses are growing at once in the same womb. Several certified cases have occurred in which women have given birth to two children, the second child being born at periods varying from 90 to 140 days later than the first. These certainly appear to be cases of superfoetation. The possibility of superfoetation in the human female has been vigorously opposed by some eminent physicians, and as vigorously defended by others. Some believe that up to the third month of gestation a second conception may follow the first, and that this will satisfactorily account for all the cases of superfoetation on record. It has also been argued that the human uterus may be *double* in some cases, and that in each of its cavities a fetus may be contained.

Superior, in Scots law, one who or whose predecessor has made an original grant of heritable property on condition that the grantee, termed the *vassal*, shall annually pay to him a certain sum (commonly called *feu-duty*) or perform certain services. The superior's relation to the property so granted is called *dominium directum*, while the vassal's right in the property is called *dominium utile*.

Superior, **LAKE**, the largest expanse of fresh water in the world, and the most

westerly and most elevated of the North American chain of lakes. It washes the shores of the state of Minnesota on the west, those of Wisconsin and the northern peninsula of Michigan on the south, and those of Canada in all other directions. Its greatest length is 420 miles, greatest breadth 160 miles; circuit about 1750 miles; area about 32,000 square miles (or the same as that of Ireland). It is 630 feet above sea-level, and varies in depth from 80 to 200 fathoms. In shape it forms an irregular crescent, dotted with numerous islands towards its northern and southern sides. The northern shore consists of cliffs varying in height from 300 to 1500 feet, but the southern shore is low and sandy, although occasionally interrupted by cliffs, amongst which are the fantastic Pictured Rocks, 300 feet high, one of the greatest natural curiosities of the United States. The waters of the lake are remarkable for their transparency, and are well stocked with fish, principally trout and white-fish. The lake receives many streams, but none of much size. The outlet is at the south-east, by St. Mary's River (which see), and immense quantities of grain, iron ore, timber, &c., pass out by means of canals. Duluth, Superior, Marquette, Port Arthur, &c., are lake ports.

Superior Planets. See *Planets*.

Supernaturalism, a term used chiefly in theology, in contradistinction to *rationalism*. In its widest extent supernaturalism is the doctrine that religion and the knowledge of God require a revelation from God. It considers the Christian religion an extraordinary phenomenon, out of the circle of natural events, and as communicating truths above the comprehension of human reason. Rationalism maintains that the Christian religion must be judged of, like other phenomena, by the only means which we have to judge with, namely reason. See *Rationalism*.

Supple-jack, a popular name given to various strong twining and climbing shrubs. The supple-jack imported into Europe for walking-sticks is the barked branches of one or more West Indian species of *Paullinia*, natural order Sapindaceae. The name is also given to a rhamnaceous twiner (*Berchemia volubilis*), found in the Southern States of America.

Supplicants, **THE**, a name assumed in 1637 by the petitioners against the introduction of Laud's Service Book and the Book of Canons into the Scottish Church. The Supplicants signed the Covenant in

1638, and were thenceforward known as Covenanters.

Supply, **COMMISSIONERS OF**. See *Commissioners of Supply*.

Supply, **COMMITTEE OF**. IN Britain all bills granting supplies of money for public service must originate in the House of Commons, and according to the rules of procedure of that House questions of supply must first be considered in a committee of the whole House. This committee is called a committee of supply. In committee members of the House may speak repeatedly on the same question. The means of raising the sums voted in supply are discussed in a committee of ways and means. These two committees sit at intervals during the greater part of the session, and are presided over by a salaried chairman appointed at the beginning of each parliamentary session.

Supporters, in heraldry. See *Heraldry*.

Suppuration. See *Inflammation*.

Supralapsarians, in theology, those who maintain that God, antecedent to the fall of man, decreed the apostasy and all its consequences, determining to save some and condemn others, and that in all he does he considers his own glory only; opposed to *Sublapsarians* (which see).

Supra-renal Capsules, two small yellowish glandular bodies which exist, one at the front portion of the upper end of each kidney. (See *Kidney*.) They have no excretory duct, and are connected with the kidneys by areolar tissue only. They consist of an outer or *cortical*, and an inner or *medullary* portion; the former being of a deep yellowish colour, and the latter of a dark brown or black hue, and of a soft and pulpy formation. The capsules are furnished with numerous nerves, and derive their blood from the *aortic*, *renal*, and *phrenic* arteries, returning it by the *supra-renal* vein. They are present in all mammals. Their exact functions are as yet uncertain. In the embryo they are larger than the kidneys themselves, but in the adult possess only about $\frac{1}{10}$ th of their original bulk. See *Addison's Disease*, *Adrenalin* (in *Supp.*).

Supremacy, **ROYAL**, as a term in English law, is practically restricted to denote the authority of the crown in matters ecclesiastical. After the abolition of the papal supremacy at the English Reformation, the royal supremacy was affirmed by various acts under Henry VIII and Elizabeth, all enforcing an *oath of supremacy*. The oath

SUPREME COURT OF JUDICATURE — SURAT.

was taken by holders of public offices along with the oath of allegiance, and afterwards with that of abjuration, until the three were consolidated in one by 21 and 22 Vict. c. 48. This was again subjected to revision in 1868. The new oath of allegiance imposed upon members of parliament does not expressly affirm the royal supremacy in ecclesiastical matters.

Supreme Court of Judicature, an English court constituted by the Supreme Court of Judicature Act, 1875, which provided for the union and consolidation together of the higher courts, such supreme court consisting of two permanent divisions called the *High Court of Justice* and the *Court of Appeal*. The High Court of Justice has original jurisdiction in all causes of action, with appellate jurisdiction in certain cases from inferior courts. It is a superior Court of Record, and in it is vested the jurisdiction previously exercised in common law and equity cases by the Court of Chancery, any jurisdiction formerly exercised by the Courts of King's Bench, and of Common Pleas at Westminster, the Court of Exchequer in revenue and common law cases; the Courts of Admiralty and of Probate, Divorce and Matrimonial Causes, of Common Pleas at Lancaster and at Durham, and the courts created by the commissions of assize, of Oyer and Terminer, and of jail delivery. The ordinary judges (or justices) of the High Court have equal power, authority, and jurisdiction, but they sit in three divisions: the Chancery division, consisting of five justices, with the lord-chancellor of England as president; the King's Bench division, consisting of fourteen justices and the lord chief-justice as president; and the Probate, Divorce, and Admiralty division, consisting of two judges or justices. The criminal jurisdiction of the court is exercised entirely by the King's Bench division. The lord-chancellor is not to be deemed a permanent judge of the court. The Court of Appeal has appellate jurisdiction only, with such original jurisdiction as may be necessary to dispose of cases of appeal. It consists of four *ex-officio* judges and of five ordinary judges appointed by letters-patent. The ordinary members of the court are called Lords Justices of Appeal. The four *ex-officio* judges are the lord-chancellor, who is the president, the Lord Chief-justice of England, the Master of the Rolls, and the President of the Probate, &c., division. The Court of Appeal is

a superior Court of Record, and the highest court of appeal under the House of Lords. In hearing ecclesiastical appeals the court is composed of judges and assessors, the latter being archbishops or bishops of the Church of England. The supreme courts and any of the judges are at liberty to sit at any time or place. Commissioners of assize on circuit are continued. Matters not proper to be heard by a single judge are to be heard by divisional courts of the High Court consisting of three or not less than two judges. The determination of these divisional courts is to be final, unless the court gives special leave to appeal. No appeal is to lie from any judgment of the High Court in criminal matters except for error of law apparent on the record passed regarding which no question has been reserved. In the Court of Appeal every appeal must be heard and the decision given by a division of the court. A barrister of ten years' standing is qualified for the appointment of judge of the High Court of Justice; for the Court of Appeal, the qualification is to be a barrister of fifteen years' standing, or alternately to have been a judge of the High Court for the period of a year. All judges, except the lord-chancellor, hold office during good behaviour, subject to power of removal by the sovereign on an address from both houses of parliament.

Surabaya. See *Sourabaya*.

Suradanni, a valuable kind of wood growing in Demerara.

Suraj'ah Dow'lah (*Siraj-ud-Daulah*), the last independent nawaub of Bengal, under whom was perpetrated the massacre of the Black Hole (which see). He succeeded his grandfather, Ali Verdy Khan, in 1756, and within two months of his accession found a pretext for marching on Calcutta. On the arrival of Clive and Admiral Watson he retreated to Moorsshedabad, but was routed at the battle of Plassey (June 23, 1757). He then fled up the Ganges, but was betrayed by a *fakir*, and was put to death by order of the son of Meer Jaffier, the new nawaub. Surajah Dowlah's reign lasted fifteen months, his age at the time of his death being barely twenty.

Surakarta. See *Sourakarta*.

Surat, a town of India, Bombay Presidency, capital of a district of same name, on the left bank of the Tapi, about 20 miles above its mouth in the Gulf of Cambay. The town possesses few attractions,

and consists in the older part of narrow winding streets with lofty houses. It has some handsome mosques and temples, Protestant and Roman Catholic churches, military cantonments, and an old castle or fortress now containing public offices. The chief exports are agricultural produce and cotton; but the importance of the town is small compared with former times, Surat in the 18th century being perhaps the foremost city in India. Pop. 119,306.

Surd. See *Irrational Quantities*.

Surety. See *Guarantee*.

Surf-duck, or **SURF-SCOTER**, a species of duck (*Oidemia perspicillata*), about the size of a mallard, rarely seen on the British coasts, but frequent on the coasts of Labrador, Hudson's Bay, and other parts of North America. See also *Scoter*.

Surgeon-fish. See *Sea-surgeon*.

Surgeons, ARMY AND NAVY. Candidates for commissions in the British army and navy must be twenty-one and not over twenty-eight years of age. An approved candidate for the army must pass a competitive examination; if successful, he is nominated surgeon on probation, has to attend the special course of instruction and pass another examination, after which he receives his commission. (See *Army Medical Service*.) In the navy commissions are similarly obtained, the candidate receiving his practical instruction at Haslar Hospital, near Portsmouth. There are various grades of rank in both services.

Surgeons, ROYAL COLLEGE OF, an English medical body established in London, descended from the Company of Barber-surgeons, incorporated by royal charter in 1461. A separate association of surgeons was formed some years later, but in 1540 the two companies were united by act 32 Henry VIII. cap. xlii. into one corporation under the title of Masters or Governors of the Mystery and Commonalty of Barbers and Surgeons in London. In 1745 the latter were raised into a separate corporation. By a new charter granted in 1800 the title of the company became the Royal College of Surgeons in London; and by another charter granted in 1843 the name of the corporation was changed to that of the Royal College of Surgeons of England; and the college was authorized to create a portion of its members fellows. The government of the college is vested in a council of twenty-four members, including president and vice-presidents, the whole to

be fellows of fourteen years standing. A court of examiners of ten members (fellows) with a president and two vice-presidents, is elected by the council. The college also appoints special examiners in midwifery, dental surgery, and in various departments of scholarship, preliminary to fellowship examination. The examination for membership of the college includes a preliminary examination in general scholarship, an anatomical examination, and the surgical or pass examination. By the Medical Act 1858, the college is one of the bodies authorized to license practitioners of medicine within the United Kingdom. (See *Medical Act*.) The buildings of the college are on the south side of Lincoln's Inn Fields. They contain a museum, library, and theatre for lectures. The museum is one of the most valuable scientific collections in the world. The new examination hall is on the Victoria Embankment, and was opened in 1889.

Surgery, the operative branch of medicine, or that part of the medical art which is concerned with the removal of injured parts or organs, or with the healing of lesions by means of operations on the parts affected, either by the hand or with instruments. Surgery early became separated, for practical ends, from medicine, and by a natural expansion came to embrace two parts, the science pertaining to surgical operations, and the art required for conducting them. From this arose a mischievous distinction between medical and surgical cases. We have thus surgical and medical anatomy, surgical and medical pathology, and surgical and medical clinics. But the progress of science has both extended the domain of surgery, and made the relation between it and medicine more intimate. The origin of surgery may almost be held to be coeval with the human race. Herodotus says that the medical art in Egypt was divided into numerous branches representing each member of the body. The Greeks made considerable progress in surgery, and the Hippocratic collection contains six surgical treatises in which important operations are described as conducted in a mode little behind the modern practice. Medicine was first cultivated at Rome by Greek slaves. It afterwards became a special science, and among its professors who advanced the art of surgery were Archagathus (200 B.C.), surnamed the executioner, from his frequent use of the knife; Asclepiades, to whom is attributed the origin of laryngotomy; and The-

SURGERY.

mison, the first to use leeches. A greater name than these is that of Celsus, called the Latin Hippocrates, who flourished about the beginning of the Christian era. He mentions autoplatic operations and the treatment of hernias, and his method of amputation is still occasionally employed. Galen (died 200 A.D.) did much for medicine but little for surgery. Paul of Ægina, a practitioner of the 7th century, may be looked upon as the last representative of the Græco-Roman school. The Arabs were initiated into medicine and surgery by the translation of the works of the Greeks. Among the Asiatic Arabs the only devoted student of surgery who has left any record of his art is Abulcasis, who flourished at the beginning of the 12th century.

On the decline of the Roman Empire, the medical art in Europe fell entirely into the hands of the monks, and when, in 1163, the Council of Tours prohibited the clergy from performing any operation, surgery became incorporated with the trade of barber, and was reduced to the simplest operations, chiefly that of letting blood. The earliest revival of science arose from the contact of Europeans with the Eastern nations, particularly the Arabs, and before the close of the 11th century Salerno, in Italy, acquired celebrity for a school of medicine in which all the teachers were laymen. This school acquired the right to confer the degrees of master and doctor. Among surgeons of reputation of the Salernian school, may be mentioned Roger of Parma, and his disciple Roland, who made great use of cataplasms and other emollients. Guy de Chauliac, the first great surgeon of France, belongs to the latter half of the 14th century. Berengario de Carpi held a chair at Bologna from 1502 to 1507. He boasted of having dissected more than 100 dead bodies, and made important discoveries. Vesalius, a Belgian physician, born 1514, died 1564, is regarded as the father of modern anatomy. He prepared the way for Ambrose Paré, who did for surgery what Vesalius had done for anatomy. Paré was surgeon in ordinary to Henry II., Charles IX., and Henry III. His works were translated into English, and include a general treatise on surgery, and a special treatise on wounds. Among the great surgeons of the 16th century were Paracelsus, who advocated a thorough reform in surgery; Guillemeau, whose special study was ophthalmia; Pineau, a skilful surgeon and lithotomist; Jacques Démarque,

one of the first authors who wrote on bandages; and Fabricius of Hilden in Germany, the author of a complete course of clinical surgery, and the inventor of surgical instruments for the extraction of foreign bodies from the ear, urethra, &c., which are still in use. In England Harvey, the discoverer of the circulation of the blood, lectured on surgery; but a genuine school of surgery was first founded by Richard Wiseman, who has been called the Paré of England. His works were published in two vols. in 1676. In England the Company of Barber Surgeons, incorporated by Edward IV. in 1461, gave place to a separate corporation of surgeons in 1745 (see preceding article). In 1731 the Royal Academy of Surgery was founded in Paris, and soon produced a school of surgeons so eminent as to take the lead of their profession in Europe. Among eminent French physicians at this time we may mention J. L. Petit, Mareschal, Quesney, Morand, and Louis. In the English school we have Cowper, Cheselden, Percival Pott, and John and William Hunter. Pre-eminent among these are Pott and John Hunter, the latter being the most eminent surgeon and physiologist of his day. The rapid advance of scientific knowledge in the nineteenth century naturally had a decided influence on the art of surgery. The last century will ever be conspicuous in the annals of surgery as that in which the inestimable boon of anæsthetics was conferred upon mankind, by which not only has pain in surgery been abolished, but the extent of its operative department immensely enlarged. Of no less importance has been the discovery of the relation of micro-organisms to putrefaction and to infectious diseases, and the consequent introduction of the antiseptic method of treating wounds. A scarcely less noticeable feature of this epoch has been the application of the rules of hygiene to the construction and management of hospitals, by which the general health of the patients has been much benefited, and the mortality reduced. The operative skill of the surgeon has kept pace with the increased precision in physiological knowledge, and surgical operations are now performed on many parts of the body which not long ago would have been deemed certain death to the patient. Diseased conditions in the cranium, the thoracic cavity, the abdomen, the joints, are all successfully treated. Cancerous affections are boldly treated by excision, while diseases of the

uterus are now treated with a boldness and success which a few years ago seemed impossible. Among only a few eminent surgeons of the 19th century we may mention Astley Cooper, Abernethy, Brodie, Simpson, Lister, in Britain; Dupuytren, Dubois, Bichat, in France; Gräfe, Langenbeck, Dieffenbach, in Germany. A recent aid to the surgeon has been the Röntgen-rays.

Su'ricate (*Suricata tetradactyla*), an animal of the Cape Colony allied to the ichneumon, sometimes domesticated as being an exterminator of rats, mice, and other vermin.

Su'rinam. See *Guiana, Dutch*.

Surinam Bark, the bark of *Andira inermis*. See *Andira*.

Su'rinam Toad. See *Pipa*.

Sur'mullet, a name of fishes forming the family Mullidae, allied to the perches, and often called red mullets. They have two dorsal fins with a wide interval between them, the first being spinous, and two long barbels hanging from the lower jaw. The common red mullet (*Mullus barbatus*) of the Mediterranean is about 12 inches long, esteemed very delicious food, and was much prized by the Romans.

Surnames. See *Names, Personal*.

Surplice, a white garment worn by priests, deacons, and choristers in the Church of England and the Roman Catholic Church over their other dress during the performance of religious services. It is a loose, flowing vestment of linen, reaching almost to the feet, having sleeves broad and full, and differs from the *alb* only in being fuller and having no girdle nor embroidery at the foot.

Surrey, a county of England, bounded by the Thames, separating it from Buckinghamshire and Middlesex; by Kent, Sussex, Hampshire, and Berkshire; area, 485,129 acres, of which more than half is under crops. A range of hills, called the North Downs, stretches across the county from east to west, sloping gently down towards the Thames on the north, and on the south

descending precipitously to the Weald, a flat plain which extends into Kent and Sussex. The highest point in the county is Leith Hill, 965 feet, about 3 miles south of Dorking. Almost the whole of the county is drained by the Thames, with its tributaries the Wey, Mole, and Wandle. The soils include all the principal varieties of plastic and alluvial clays, rich vegetable loam, calcareous earth, and almost barren heath. On the first of these the principal crops are wheat and beans. Much of the alluvium, particularly in the vicinity of the metropolis, is occupied by orchards and kitchen-gardens, and whole farms are devoted to medical and aromatic plants, especially in the vicinity of Mitcham. The loamy soils grow excellent barley, oats, and pease, with root crops, especially carrots and parsnips. The calcareous soils are chiefly remarkable for excellent hops, especially those of Farnham. The quantity of land permanently under grass is considerably greater than the area under the plough. The vicinity of the metropolis, and the beautiful sites which the county affords, have caused many parts of Surrey to be studded over with mansions and villas. The county in its ancient area (given above) contains Southwark, Lambeth, and other metropolitan districts or boroughs; the parls., mun., and co. bor. of Croydon, and the mun. bors. of Guildford, Kingston, Godalming, Richmond, and Reigate; Guildford and Kingston being the county towns. It is now divided into six parl. divs.: North-western or Chertsey, South-western or Guildford, South-eastern or Reigate, Mid or Epsom, Kingston, and North-eastern or Wimbledon, each with one member. Pop. within ancient limits, 2,008,923; of modern county (including Croydon), 675,774 (area, 461,829 acres).

Surrey. See *Howard, Family of*.

Surrey, HENRY HOWARD, EARL OF, English poet, born about 1516, was the grandson of the Earl of Surrey who was the victor at Flodden, and who, as a reward for his services, was created Duke of Norfolk. He succeeded to the courtesy title of Earl of Surrey when his father became second Duke of Norfolk in 1524. The Howards held an eminent position at the court of Henry VIII., and Surrey's cousin, Catherine Howard, became the king's fifth wife. Shortly before Henry's death Surrey and his father were suspected of aiming at the throne, and were arrested and lodged in the Tower, and Surrey was tried, condemned, and executed on



Surplice, Brass of Prior Nelson, Cowfold, Sussex.

Tower Hill, Jan. 19, 1547. Surrey was one of the leaders of the early poetic movement under Henry VIII. Most of his poems were translations or adaptations of Italian originals. His translations of the second and fourth books of the *Æneid* are the first attempt at blank verse in the English language.

Surrogate, one who is substituted or appointed in the room of another, especially the deputy of a bishop or ecclesiastical judge. The chief duty of ecclesiastical surrogates is the granting of marriage licenses.

Sur'turbrand, fossil wood, impregnated more or less with bitumen, found in great abundance in Iceland. It is used by the Icelanders chiefly in their smithies. It is sometimes so little mineralized as to be employed for timber.

Surveying, the art of measuring the angular and linear distances of objects on the surface of the earth, so as to be able to delineate their several positions on paper, to ascertain the superficial area, or space between them, and to draw an accurate plan of any piece of ground in more or less detail. It is a branch of applied mathematics, and is of two kinds, land surveying and marine surveying, the former having generally in view the measurement and delineation on paper of certain tracts of land, and the latter the laying down of the position of beacons, shoals, coasts, &c. Those extensive operations of surveying which have for their object the determination of the latitude and longitude of places, and the length of terrestrial arcs in different latitudes, are frequently called *trigonometrical surveys*, or *geodetic operations*, and the science itself *geodesy*. In land-surveying various instruments are used, the most indispensable of which are Gunter's chain, for taking the linear dimensions when the area of the land is required; the theodolite, for measuring angles; and the surveyor's cross, or cross-staff, for raising perpendiculars. See *Geodesy*, *Trigonometrical Survey*, and *Ordnance Survey*.

Survival of the Fittest. See *Natural Selection*.

Susa, an ancient city of Persia, the capital of the province of Susiana, or Elam, was situated in the plain between the Kerkha (Chaspes) and the Dizful. It was a very extensive city, with a strongly fortified citadel, containing the palace and treasury of the Persian kings, whose chief residence it was from the time of Darius I. It is the Shu-

shan of the book of Daniel, where it is mentioned as situated on the banks of the river Ulai or Eulæus. The plain of Susa is covered with extensive mounds, in which fragments of brick and pottery with cuneiform inscriptions are found, and important discoveries have been made by Mr. Loftus, and more recently by M. Dieulafoy.

Susa (ancient *Hadrumentum*), a seaport of Tunis, on the Gulf of Hamâma, 45 miles from Kairwan. It has a rapidly increasing commerce, the chief exports being oil, grain, sansa (olive refuse), and esparto. The town has outgrown its ancient walls. Pop. 10,000.

Susannah, Book of, is one of the apocryphal additions to the book of Daniel which are found in the Greek versions of Theodotion and the Seventy. They have not been found in any Hebrew original, and are generally rejected by the Jews.

Suspension, in music, the prolongation of a note in a chord, having the effect of



Suspension (1) from above; (2) from below.

suspending for a moment certain notes in the following chord; or the delay of a dissonance in reaching the chord into which it is to be resolved.

Suspension and Interdict, in Scots law, a judicial remedy which may be applied for in the Court of Session, where the object is to stop some act or proceeding. The applicant for a note of suspension and interdict must prove that he is interested in the act or proceeding complained of.

Suspension-bridge. See *Bridge*.

Susquehan'na, a river of the United States, formed by two branches, an eastern or northern branch, 250 miles long from Lake Otsego in New York, and a western branch, 200 miles from the western slope of the Alleghanies, which unite at Northumberland in Pennsylvania. The united stream flows south and south-east, and after a course of 150 miles reaches the head of Chesapeake Bay at Port Deposit, Maryland. It is a wide but shallow stream, nowhere navigable to any extent, save in the spring.

Sussex, a southern maritime county of England, bounded north by Surrey, north and north-east by Kent, south-east and south by the English Channel, and west and north-west by Hants; area, 933,269 acres,

of which more than two-thirds is under crops. The rivers—the Arun, Adur, Ouse, and Rother, all flowing south to the English Channel—are not important. The great physical feature of the county is the range of chalk hills known as the South Downs, which traverse the county from the Hants border, near Petersfield, to the bold promontory of Beachy Head. They are chiefly used for sheep pasture, and the breed for which the county is famed is known as the 'South-downs.' The low land along the coast is remarkable for its fertility, raising heavy crops of grain, and still more valuable crops of hay. To the north of the South Downs range is the valley of the Weald, which forms the larger part of the whole surface, and consists generally of sandy or tenacious clays of a very indifferent description. The eastern part of the county borders on the hop districts of Kent, and pursues the same mode of cultivation. About 125,000 acres are covered with woods. Among the mineral products is 'Sussex' marble, a kind of limestone containing fresh-water shells, which admits of being cut and polished. The seaports are comparatively unimportant, but the mildness and equableness of the climate along the southern coast has led to the growth of numerous health resorts and watering or bathing places. The most famous of these is Brighton ('the queen of watering-places'), and next Hastings, Eastbourne, and Worthing, followed by Seaford, Littlehampton, and Bognor. The county is rich in archaeological remains, among which are the castles of Pevensey, Bodiam, Hastings, Arundel, Bramber, and Hurstmonceux. It contains the parliamentary and municipal boroughs of Brighton and Hastings, and the municipal boroughs of Arundel, Chichester, Eastbourne, Lewes, and Rye. For parliamentary purposes it is divided into six divisions—North-western or Horsham, South-western or Chichester, Northern or East Grinstead, Mid or Lewes, Southern or Eastbourne, and Eastern or Rye—each returning one member to parliament. Pop. 605,202.

Sustentation Fund, the name generally given to a fund accumulated for the support of the clergy of a church, the central fund of the Free Church of Scotland having in particular received this name. This fund is now of such magnitude that the greater number of the clergy participating in its benefits receive an equal dividend of £160 annually. See *Free Church of Scotland*.

Sutherland (sut'h-er-land), a maritime county in the north of Scotland, bounded north and west by the Atlantic, south by Ross and Cromarty, east by the North Sea and Caithness; area, 1,297,846 acres, of which about one-thirtieth part is under crops. On the northern and western sides the coast is remarkable for the loftiness and boldness of its precipices, and its deep indentations by numerous lochs or arms of the sea; but the east coast is generally flat and continuous, with sandy shores. The interior consists of a succession of lofty and rugged mountains, rising in Ben More to 3273 feet, and separated from each other sometimes by moorland plateaus, and sometimes by wild romantic valleys, either embosoming extensive lakes or traversed by mountain streams. The principal streams are the Oyckell, Brora, Helmsdale, Halladale, Naver, and Hope. The principal lochs are Loch Shin, Loch Naver, Loch Hope, Loch Assynt, and Loch More. There are valuable salmon fisheries in several of the rivers. The greater part of the county is fitted only for grazing, but on the east coast, not only oats and barley are successfully cultivated, but excellent wheat has been raised. Natural woods of birch, alder, and even oak are not uncommon; and large plantations of fir, larch, and other trees have recently been formed. Game of all kinds is abundant, and there are extensive deer forests. The herring-fishery is important. The county sends a member to parliament, and contains the royal and parliamentary burgh of Dornoch (the county town), which forms part of the Wick district of burghs. It is the most sparsely populated county in Scotland. Pop. 21,440.

Sutlej, a river of Northern Hindustan, one of the 'five rivers' of the Punjab, has its sources in Tibet, in the Himálayas, near Lake Manasarowar, at an elevation of over 15,000 feet. Passing through the Himálayas in a stupendous chasm, it flows southwest, forming the eastern boundary of the Punjab, and enters the Indus at Mithankot after a total course of about 900 miles. In the latter part of its course, after its junction with the united stream of the Jhelum, Chenab, and Ravi, it bears the name of the Panjnad.

Sutler, a person who follows an army and sells to the troops provisions, liquors, or the like. The sutlers attached to regiments in the French army are called *vivandiers*.

Su'tras (Sanskrit, 'threads'), in Sanskrit literature, the name given to the numerous

series of religious aphorisms and rules, including all the ritual, grammatical, metrical, and philosophical works, and consisting of brief sentences to be committed to memory. These were usually written on dried palm-leaves tied together by a string.

Suttee' (Sanskrit, *sati*, an excellent wife), a term applied by the English to the self-immolation of Indian widows on the funeral pile of their deceased husbands. The origin of this practice is of considerable antiquity, but it is not enjoined by the laws of Manu, nor is it based on the Vedas. It was abolished by Lord Bentinck, governor-general of India, in December 1829, but cases are still occasionally heard of.

Sutton Coldfield, an ancient market-town, and now a municipal borough of England, in Warwickshire, 7 miles north-east of Birmingham. It is a favourite place of residence with the business people of Birmingham, Walsall, and other towns. Pop. 14,264.

Sutton in Ashfield, an ancient market-town of England, in Nottinghamshire, 3 miles south-west of Mansfield. There are manufactures of cotton, hosiery, and thread, and in the vicinity are collieries and lime-works. Pop. 14,862.

Suture, in anatomy, is the line of union of two bones between which there is no motion, as the bones of the skull.

Suva, the capital of the British crown colony of the Fiji Islands. It is situated on Viti Levu, the largest island of the group, and has a good harbour. Pop. 1100.

Suvor'of-Rymnikski, PETER ALEXIS VASSILIVICH (his name is also spelled *Suvor'of*, *Suvarrou*, &c.), COUNT OF, Prince Italiski, field-marshal and generalissimo of the Russian armies, was born about 1729 or 1730, and in his seventeenth year entered the service as a common soldier. He served in the war against Sweden, in the Seven Years' war, in Poland, and against the Turks, giving many proofs of courage and conduct, and obtaining the rank of lieutenant in 1754, of lieutenant-colonel in 1763, of brigadier-general in 1768, and of general of division in 1773. In 1783 he reduced the Kuban Tartars under the Russian yoke. In 1787, as chief in command, he conducted the defence of Kinburn to a successful issue; and in 1789 he gained the dignity of count by his great victory on the banks of the Rymnik, where the Austrian troops, under the Prince of Saxe-Coburg, were surrounded by 100,000 Turks. By his timely arrival with 10,000 Russians he not only rescued

the Austrians, but occasioned the utter overthrow of the enemy. The next, and perhaps the most sanguinary of his actions, was the storming of Ismail in 1790, which was followed by the indiscriminate massacre of 40,000 of the inhabitants of every age and both sexes. He was next employed against the Kingdom of Poland, and conducted a campaign of which the partition of the country was the result, receiving a field-marshal's baton, and an estate in the dominions which he had contributed to annex to the Russian crown. The last and most celebrated of his services was his campaign in Italy in 1799, when his courage and genius for a while repaired the disasters of the allied forces. He gained several brilliant victories at Piacenza, Novi, &c., drove the French from all the towns and fortresses of Upper Italy, and was rewarded with the title of Prince Italiski. But in consequence of a change in the plan of operations he passed the Alps; and the defeat of Korsakof at Zürich, together with the failure of the expected assistance from the Austrians, obliged him to retreat from Switzerland. On his recall to Russia, preparations were made for his triumphal entry into St. Petersburg; but having incurred the displeasure of the Emperor Paul, the preparations for his triumph were suspended. Chagrin at this disgrace hastened his death, which took place May 18, 1800.

Suwalki. See *Souvalky*.

Suwar'row. See *Suvorof-Rymnikski*.

Suwarrow Islands, a group of three low wooded islands in the Pacific, about 450 miles N.N.W. of Cook or Hervey Islands, and about the same distance E. of Samoa. Annexed to Britain in 1889.

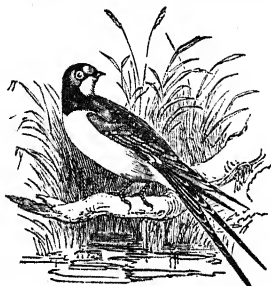
Suzerain, in feudalism, a lord paramount; the king, for instance, in relation to his immediate vassals, or these as grantors in turn to sub-vassals.

Swabia. See *Suabia*.

Swahili. See *Suaheli*.

Swallow, the general name for all the insessorial birds of the family Hirundinidæ, distinguished by their long and powerful wings, their short broad beak, their wide gape, their comparatively small and weak legs and feet, and their habit of hawking on the wing for insects, which constitute their food. They are found all over the world except in the coldest regions, and there are a number of species. Three are British, the common or chimney swallow (*Hirundo rustica*), the house-martin (*H.*

urbica), and the sand-martin (*H. or Cotile riparia*). The common swallow has the nostrils concealed by a membrane in front, and the outer feathers of the tail much elongated. It is about $8\frac{1}{2}$ inches in length. The top of the head is coloured of a reddish-chestnut hue, the back and wings being steel-blue. The tail and secondary feathers are black,



Chimney Swallow (*Hirundo rustica*).

a dark-blue patch existing at the upper part of the chest, whilst the throat is a chestnut-brown. The beak, legs, and toes are black, and the under parts are white or grayish. The females possess the chest-patch, and also the forehead patch of red, of smaller size than the males. The song is weak, and is at best a mere twitter. The nest consists of a cup-shaped structure of mud or clay, sometimes built a few feet down an unused chimney, often close under the roof of some outhouse to which ready access is obtained, and is lined inside with soft grasses, feathers, and other materials. The migration of the common swallow has always attracted attention from the well-known and unvarying character of the movements of these birds. In Britain they fly southwards about the end of October, or sometimes sooner, to winter in Africa, some finding their way to India, and they arrive again in Britain in the succeeding April. They generally return to the nests they have constructed, and appear to exhibit great distress on finding their former home swept away. Swallows bear a considerable resemblance to swifts (which see), and among the swifts are several forms which are popularly named 'swallows.' Thus the bird known in N. America as the chimney swallow is not a true swallow, but a swift (*Chaetura pelagica*). The swallow that produces the edible nest is also a swift. Of true swallows, however, several are American, and among them the barn swallow (*H.*

horreorum), very similar to the European chimney swallow, the purple martin (*Progne subis*), and the cliff swallow (*Petrochelidon lunifrons*). The name of 'sea swallow' is given to the tern (which see). See also *Martin*, *Sand-martin*.

Swallow-tailed Butterfly and Moth, names given to the *Papilio Machaon*, a beautiful species of butterflies, and to the *Durapteryx sambucaria*, a common British moth, so called because the hinder wings are prolonged into small tails.

Swallow-wort. See *Celandine*.

Swammerdam, JOHN, one of the most eminent Dutch naturalists of the 17th century, was born at Amsterdam in 1637, and was destined for the church, but embraced the profession of medicine. He was devoted especially to the study of insects; and his General History of Insects and other works laid the foundations of the modern science of entomology. He died in 1680.

Swan (*Cygnus*), a genus of swimming birds, family Cygnidae, distinguished as a group by the bill being of equal length with the head, and broad throughout its length; by the *cere* being soft; by the front toes being strongly webbed, whilst the hinder toe is not webbed, and has no lobe or under-skin. The species which inhabit or visit Britain are the mute or tame swan (*C. olor* or *mansuetus*), the whooper, whistling, or wild swan (*C. musicus* or *ferus*), and Bewick's swan (*C. Bewickii*). The mute or tame swan, so named from having little or no voice, is the only species which is permanently resident in Britain. The nest is constructed of reeds and grasses, and is generally situated near the edge of the water on some islet. The young ('cygnets') when hatched are of a light bluish-gray colour. The food consists of vegetable matters, smaller fishes, worms, &c., and fish-spawn. The wild swan and Bewick's swan pass the winter in Great Britain, flying northward in the spring. The first is a native of Iceland, eastern Lapland, and northern Russia; the second has its home further east. They have their representatives in North America in the trumpeter swan (*C. buccinator*), and the *C. columbianus* or *americanus*. South America produces one very distinct species, the beautiful black-necked swan (*C. nigricollis*). The black swan (*C. atratus*) of Australia, like the white swan, is frequently kept as an ornament in parks or pleasure grounds. Its large size, and the gracefulness of its form and

motions, render the swan one of the most ornamental of all the water-birds. In England, from a very early date, it has been specially protected by both legal and regal interference. In Henry VII.'s reign the theft of a swan's egg was deemed an offence punishable by a year's imprisonment. Swans themselves, at a prior date, were declared to be exclusively 'royal' or 'king's' property; and no subject was entitled to hold possession of these birds, save under special favour from the sovereign. To such subjects as possessed the permission to keep swans a special or 'swan' mark was attached, and this mark was cut on the bill of the bird as a distinctive badge of ownership. The process of marking is known as 'swan-upping' or 'hopping,' and the ceremony is yet annually carried out on the Thames on behalf of the crown, the universities of Oxford and Cambridge, and several of the London guilds or companies.

Swanevelt, HERMANN, landscape-painter of the Dutch school, born about 1618. He set out for Italy when very young, and, captivated by the pictures of Claude Lorraine, became a scholar of this famous master. He died at Paris in 1655.

Swan River, a river in Western Australia, which colony was originally known as the 'Swan River Settlement.' Perth, the capital of the colony, is on the Swan River, and Fremantle is at its mouth.

Swansdown, a name for a fine, soft, thick woollen cloth; or more commonly for a thick cotton cloth with a soft nap on one side.

Swansea (Welsh, *Abertawe*), a seaport town, and municipal, parl., and county borough of Wales, Gower Peninsula, county of Glamorgan, at the mouth of the river Tawe, at its entrance into Swansea Bay, Bristol Channel. The ancient town consisted of a few narrow streets at the mouth of the river, with a Norman castle, the massive tower of which is still an object of interest. The modern town faces the bay, the new streets and villas created by the growth of the town extending back from it. Copper-works were first established in 1719, and Swansea is now the seat of the principal copper-works in the kingdom. Copperore and crude copper are imported in great quantities, as well as zinc ore, lead and silver ore, &c., and in the immediate neighbourhood is an abundant supply of coal for smelting and metallurgy. There are also important tin-works, iron-works, steel-works, alkali-works, &c. The docks are extensive and com-

modious, and there is an active trade; coal, copper, iron, and iron and steel manufactures, chemicals, &c., being exported. Since 1885 Swansea town and dist. have sent two members to parliament. Pop. of county bor., 94,537; of parl. bor. (including Aberavon, Kenfig, Loughor, Neath, and Swansea), 128,052.

Swatow, a port of China, in the province of Kwang-tung, at the mouth of the Han River. It is entirely of modern origin, being built on ground recovered from the sea. It was opened to foreign commerce in 1869. The chief trade is with Hong-Kong. The principal exports are sugar, paper, tobacco, tea, and the grass-cloth made in the town and district. Swatow has also other manufactures, besides sugar-refining. Pop. 31,000.

Swaziland, a small native state in South Africa, under British control, on the south-east of the Transvaal; area, 6540 sq. miles. It is mountainous, with fertile valleys, and great mineral wealth, especially gold and coal. The Swazis are of the Zulu race, and have always been friendly to the British. The Transvaal Boers gained such an influence in the country that in 1895 Britain allowed it to pass under their supremacy. There is now a separate administration, and native laws are partly in force under British magistrates. Seat of government, Mbabane. Pop. 85,484.

Sweaborg, or **SVEABORG**, a fortress of Russia, in Finland, on seven small islands off the harbour of Helsingfors. It is the seat of a great naval harbour and arsenal. In 1855 it was bombarded by the British and French fleets.

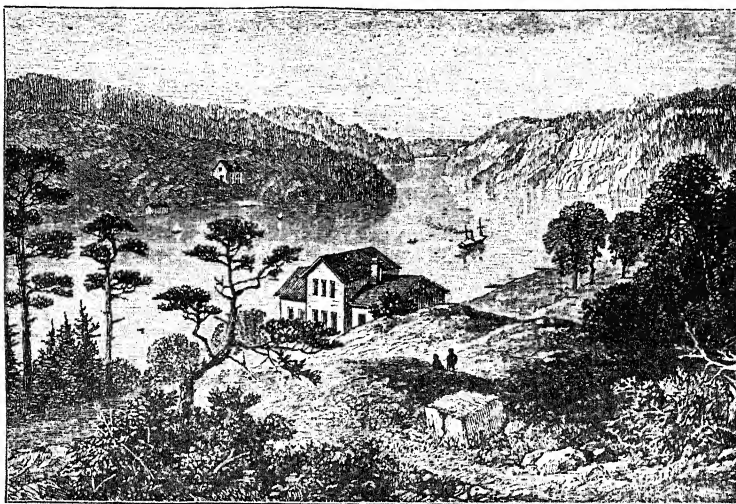
Sweat. See *Perspiration*.

Sweating Sickness, in medicine, a febrile epidemic disease of extraordinary malignity which prevailed in England towards the end of the 15th century and the beginning of the 16th, and spread very extensively over the Continent. It appears to have spared no age or condition, but is said to have attacked more particularly persons in high health, of middle age, and of the better class. Its attack was very sudden, and the patient was frequently carried off in one, two, or three hours. It seems to have first appeared in the army of the Earl of Richmond upon his landing at Milford Haven in 1485, and soon spread to London. It broke out in England four times after this, in 1506, 1517, 1528, and 1551. The process eventually adopted for its cure was to promote perspiration and carefully avoid exposure to cold.

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Sweating System, the system by which sub-contractors undertake to do work in their own houses or small workshops, and employ others to do it, making a profit for themselves by the difference between the contract prices and the wages they pay their assistants. The object of the sub-contractor or sweeper being to secure as large a margin of profit as possible, the tendency of the system is to grind the workers down to the

lowest possible limit. A report to the Board of Trade on the Sweating System at the east end of London, prepared by Mr. John Burnett, the labour correspondent of the Board, was published in Dec. 1887, and a committee of the Lords was subsequently appointed to inquire into the sweating system in the east end of London. The scope of the commission was afterwards extended, and the localities investigated comprise



Scene in Sweden—The Skurusund near Stockholm.

London, Sheffield, Newcastle, Leeds, Glasgow, Edinburgh, Liverpool, Manchester, Birmingham, &c. The report of this commission (1890) has led to various ameliorations by legislation. An exhibition of sweated industries held in the west of London in 1906 led to a conference at the Guildhall, where the enforcement of a legal minimum wage was agreed upon as the principal legislative remedy.

Sweden (Swedish, *Sverige*), a kingdom in the north of Europe, forming with Norway the great Scandinavian peninsula. (See map at *Norway*.) It consists of the three great divisions of Swealand or Sweden Proper in the middle, Götland or Gothland in the south, and Norrland in the north. For administrative purposes it is divided into twenty-five *läns* or governments. The total area is 172,875 sq. miles; the population at the census of 1900 was 5,136,441;

as reckoned in 1905, 5,294,885. There are six towns with a population of 30,000 upwards, namely, Stockholm (capital), Göteborg or Gottenburg, Malmö, Norrköping, Gefle, and Helsingborg. Nearly 2,500,000 of the population are agricultural; about a quarter of a million are cultivators of their own land.

Physical Features.—The coast-line, above 1400 miles in length, is serrated rather than deeply indented. The west coast is very rocky, but seldom rises so high as 30 feet. Along the south and south-east coast low shores alternate with precipitous cliffs, which, however, are of no great elevation. A great number of islets are scattered near the shores. There are also two islands of some size: Oeland near the south-east coast, and Gothland further out in the Baltic. The whole of the upper part of the shore of the Gulf of Bothnia consists of sandy alluvial

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deposits. The interior has far less of a highland than of a lowland character. From the mountains or elevated masses which run along the frontiers of Norway, with summits that rise more than 6000 feet above sea-level (Sarjek is 6972 feet), the country slopes east towards the Gulf of Bothnia, and south to the shores of the magnificent lakes which stretch almost continuously across the country east to west near lat. 59° N. South of the lakes the country is generally flat, and there are areas of barren sand or stunted heath, interspersed with forests, meadows, and corn-fields. The Plain of Scania, occupying the whole of the southern peninsula between the Sound on the west and the Baltic on the south and east, is generally a fine tract of land. The rivers and lakes are very numerous. To the Baltic basin belong the Torneå, the Luleå, Umeå, the Angermann, the Ljusne, and the Dal. The principal rivers belonging to the basin of the German Ocean are the Klar and the Göta. In general the rivers are useless for navigation, and the chief natural means of internal communication are the lakes, the chief of which are Lake Wener (area, 2014 square miles), Lake Wetter (715 square miles), and Lake Mälär, which has the capital on its shores. By canal, lake, and river there is an inland waterway—the Göta Canal—from the Kattegat to the Baltic. Almost the whole country is composed of gneiss, partially penetrated by granite. The chief mineral is iron, which is produced in large quantities, of excellent quality, admirably adapted for steel. Zinc, copper, and silver are also raised. Coal is worked in the south, but is poor in quality. Iron-mining is one of the chief industries.

Climate, Fauna, &c.—There is hardly any spring or autumn intervening between the heat of summer and the cold of winter, which in the north lasts for nine, and in the south for seven months. The extremes of heat and cold are much greater than in Britain; but on the whole the climate is eminently favourable to health. Among the larger wild animals are the wolf, bear, elk, red and roe deer, lynx, glutton, fox, and even the beaver. Of the smaller animals the most destructive is the lemming. Among birds the most remarkable are eagles, the eagle-owl, and the capercaillie. The rivers and lakes are well stocked with salmon and trout.

Agriculture, Manufactures, and Trade.—Of the total land area nearly 9 per cent is

under cultivation, nearly 4 per cent under natural meadows, and 52 per cent under forests, especially pine and fir. Of the cereal crops the principal is oats. Other cereal crops are rye and barley, wheat being cultivated to a comparatively small extent. The potato is grown everywhere. The sugar-beet is cultivated in the south. The principal domestic animals are cattle, sheep, horses, swine, and reindeer—the last kept in large herds by the Laplanders. The manufactures include iron, steel, timber and wooden goods, woollens, cottons, wood-pulp, paper and paper goods, leather, glass, earthenware, matches, machinery, ship-building, calcium carbide, sugar, tobacco, spirits, beer, margarine, &c. The total annual value of exports to all countries amounts to about £28,000,000; imports to about £34,000,000. The greater part of the trade is with Great Britain and Germany. The chief imports are coal, rye and wheat, ironware, machinery, copper, cotton, petroleum, skins, fish, wool and woollens; and the principal exports are timber, iron and iron ore, butter, wood-pulp, paper, machinery, joinery, ironware, and matches. The mercantile marine has a burden of 648,000 tons. Malmö, Göteborg, and Stockholm are the chief seaports. There are over 7600 miles of railway, and about 19,000 miles of telegraph and telephone lines. The chief denomination of money is the krona = 1s. 1½d., or about 18 to the pound sterling. It is equal to the Norwegian and Danish krone, and is divided into 100 öre. The metric system of weights and measures is obligatory.

People.—The inhabitants of Sweden, with the exception of the Laplanders, numbering about 7000, and the Finns, numbering about 20,000, found only in the north, belong to the Scandinavian branch of the Teutonic family, and are characterized by a tall, robust build, light hair, blue eyes, and light complexions. The Lutheran faith is recognized as the state religion. Other religions are tolerated; but appointments in the public service can be held by Lutherans only. Elementary education is gratuitous and compulsory, and almost every person can read and write. There are two universities, at Upsala and Lund respectively.

Government, &c.—The crown is hereditary in the male line. The king must be a member of the Lutheran Church, and has to swear fidelity to the laws of the land.

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Legislative power is exercised, in concert with the sovereign, by the diet, in which is invested the right of imposing taxes. The diet or parliament consists of two chambers. The first or upper chamber consists of 150 members, elected for nine years and serving gratuitously. The second chamber consists of 230 members, elected for three years and paid for their services. The executive power is in the hands of the king, under the advice of a council of state consisting of about ten members, eight of whom are departmental heads. Stockholm is placed under a governor-general, and each of the other läns under a prefect, nominated by the king. About a third of the revenue is derived from direct taxes and from national property, including railways; the remainder from customs, excise, and other indirect taxes. The total annual revenue amounts to about £12,000,000, and the expenditure to the same amount. The public debt, contracted entirely for railways, amounts to about £21,000,000. The peace strength of the army is about 38,000 men, the majority raised by conscription, by annual levy from among men between the ages of 21 and 40. The navy is intended for coast defence, and numbers some thirteen armoured vessels of small displacement, besides torpedo gunboats, destroyers, &c.

History.—The history of Sweden before the union of Calmar in 1397 is rather obscure in its earlier part and rather confused throughout. Christianity was introduced by German missionaries in the 9th century, and the first Christian king, Olaf Skötkonung, ascended the throne about 1001, but for some time after there was a keen conflict between the Christian and the Pagan parties. One of the most notable men of this early time was Birger Jarl, a sort of mayor of the palace under Eric the Stammerer (1222–1250), who gained so strong a position that he was able to place his son Valdemar on the throne in 1250. Valdemar was dethroned by his brother Magnus Ladulås (1275–1290), a vigorous ruler and wise lawgiver. Sweden and Norway came under the same king in the person of Magnus Smæk, a nephew of Birger, in 1319, and with him began the series of events which led to the union of the three Scandinavian kingdoms under Margaret of Denmark and her nephew Eric of Pomerania (Eric XIII.) in 1397.

Margaret died in 1412, and thereafter Eric XIII. ruled alone, but his incompetence

and oppression drove the Swedes to revolt under Engelbrekt Engelbrektsson, and in 1436 he was compelled to appoint Karl Knutsson as regent in Sweden. In 1448 Christian of Oldenburg became king of Denmark and Norway, but the Swedes proclaimed Karl Knutsson king; and after banishments and recalls he died king of Sweden in 1470. Sten Sture the Elder, a nephew of Knutsson, was appointed administrator in 1471, and King Christian was defeated in an attempt to enforce his claims. Christian died in 1481, and was succeeded by his son Hans, who invaded Sweden and established his authority in 1497. Sture was, however, recalled by the Swedes in 1500, and ruled till his death in 1503. Christian II. succeeded his father Hans in 1513, and thrice invaded Sweden. Sten Sture the Younger was defeated and mortally wounded, and Christian was crowned at Stockholm in 1520. He signalized his coronation by wholesale executions, notably the Blood Bath of Stockholm, and in consequence a rebellion took place in 1521 under Gustavus Vasa, who in 1523 was proclaimed independent king of Sweden.

Gustavus Vasa, whose reign extended from 1523 to 1560, introduced the Lutheran religion as that of the state, and in 1544 he made the monarchy hereditary. He was succeeded by his eldest son, Eric XIV., a cruel and half-insane man, who was deposed in 1568 by his brother John. John ascended the throne as John III., and caused Eric to be poisoned in 1577. He concluded the peace of Stettin, by which the separation of Sweden from Denmark and Norway was definitely ratified. John's son, Sigismund, who came to the throne in 1592, was brought up in the Catholic faith in Poland, but he undertook to maintain Protestantism in Sweden. He did not keep his promise, and was deposed in 1599, Duke Charles of Södermanland, youngest son of Gustavus Vasa, being appointed regent. In 1604 the regent was proclaimed king as Charles IX. On his death in 1611 his son Gustavus II. (Gustavus Adolphus) ascended the throne. This famous monarch, aided by his chancellor, Axel Oxenstjerna, reorganized the administration of the country, promoted industry, commerce, and education, and strengthened the army and navy. He negotiated the conclusion of wars begun by his father against Denmark and Russia, and played a great part in Germany as the champion

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of Protestantism during the Thirty Years' war. He met his death at the battle of Lützen in 1632, and was succeeded by his daughter Christina. The Peace of Westphalia, which ended the Thirty Years' war in 1648, added to Sweden Bremen, Verden, and a large part of Pomerania, while Sweden already possessed on the Russian side of the Baltic, Livonia, Esthonia, and other territories. Christina, who had left the real work of government to Oxenstjerna, abdicated in 1654, leaving as her successor Charles X., son of a sister of Gustavus Adolphus. Charles's short reign (1654-1660) was mostly occupied by wars with Poland and Denmark. Charles XI., son of his predecessor, came to the throne at the age of four. The country was then long under a council of regency, but Charles assumed the government in 1672. He reorganized the army, adopting a regular system of conscription, and restored the finances. He died in 1697, and was succeeded by his son, the celebrated Charles XII. (See *Charles XII.*) His career of conquest ended in the disastrous battle of Poltava, 8th July, 1709, and he was killed at the siege of Fredrikshald, 30th November, 1718, while pushing the conquest of Norway. He was succeeded by his sister, Ulrica Eleonora, who in 1720 resigned the government to her husband Frederick I., crown-prince of Hesse-Cassel. The absolute authority which the crown had enjoyed under Charles XI. and Charles XII. was checked by the power of the nobles, and Sweden now lost most of her great overseas possessions—Livonia, Esthonia, Ingermanland, part of Finland, &c. The struggles of the Hats and Caps, the former a war party and the latter in favour of peace, began at this time. On the death of Frederick in 1751 Adolphus Frederick of Holstein-Gottorp was elected king. During his reign the country was distracted by the rivalries of the Hats and Caps, and the royal power sank to a shadow. Adolphus died in 1771, and was succeeded by his son Gustavus III., whose reign was distinguished by a monarchical revolution. (See *Gustavus III.*) He was assassinated at a ball by Count Ankarström in 1792. His son Gustavus IV. was deposed, and his family declared for ever incapable of succeeding to the crown, in 1809. (See *Gustavus IV.*) His uncle, the Duke of Södermanland, was declared king with the title of Charles XIII.

(See *Charles XIII.*) Finland was finally ceded to Russia in 1809. In 1810 the states elected Jean Baptiste Bernadotte crown-prince. (See *Bernadotte.*) In the final struggle with Napoleon previous to 1814 Sweden joined the allies, while Denmark took the part of France. By the Treaty of Kiel (1814) Sweden ceded to Denmark her last German possessions in Pomerania, while Denmark was compelled to cede Norway to Sweden. Norway resisted the cession, and accepted Charles as king only when he had agreed to their free constitution as a separate state. Bernadotte succeeded to the crown in 1818, under the title of Charles XIV. He died in 1844, and was succeeded by his son Oscar I., whose reign was singularly peaceful and uneventful. (See *Oscar I.*) He died in 1859, and was succeeded by his son Charles Louis Eugene, under the title of Charles XV., whose reign was marked by constitutional reforms. Charles XV. died in 1872, and was succeeded by his brother Oscar II., a wise and prudent ruler. In 1905 the union between Norway and Sweden was dissolved by mutual agreement after negotiation (see *Norway*), and after the Norwegian legislature had decreed its dissolution. Oscar II. died in Dec. 1907, and was succeeded by his son Gustavus V.

Language and Literature.—The Swedish language is akin to Danish and Norwegian, being a descendant of the ancient Norse, the original of the Scandinavian branch of the Germanic tongues, of which the purest representative at the present day is the Icelandic. The earliest writings extant are the ancient provincial laws and the oldest ballads, which belong to the 13th century. In the 14th century translations of the chivalric romances of Southern Europe were introduced, and were followed by Biblical and theological translations and chronicles. The University of Upsala was founded in 1478, and printing was introduced into Stockholm in 1483. During the 16th century the literature, influenced by the Reformation, was chiefly polemical. The earliest translation of the New Testament (1526) was by Olaus Petri, whose brother, Laurentius, the first Protestant archbishop of the kingdom, translated the Old Testament, published in 1541. A Swedish chronicle, *Svensk Krönika*, was written by Olaus and revised by his brother. Olaus also attempted the drama. The Thirty Years' war exercised a very favourable influ-

ence on Swedish literature. Several libraries captured by Gustavus Adolphus were sent into Sweden, and his daughter Christina became a liberal patron of literature, and brought many learned men to the country. The 17th century was chiefly characterized by the dramas of Messenius, and by the didactic and other poems of Stjernhjelm, 'the father of Swedish poetry' (1598-1672). In the 18th century French and English literature had much influence on that of Sweden. Olof von Dalin (1708-63) now took the chief place in verse and prose, other poets being Mrs. Nordenflycht, Creutz, and Gyllenborg. Among the great names of this century in science are those of Swedenborg (1688-1772), Linnaeus (1707-78), Torbern Olof Bergman (1735-84), Karl Wilhelm Scheele (1742-86), Celsius (1701-44). Karl Mickel Bellman (1740-95) was a song-writer of great merit. Mörk (1714-63) was the first Swedish novelist. Berzelius (1779-1844), one of the first chemists of his age, belongs essentially to the 19th century, as do Tegnér (1782-1846), bishop of Vexjö, the greatest name in Swedish literature, whose *Story of Frithiof* was translated into every European language; Fredrika Bremer (1801-65), the Finnish poetess, whose stories were popular far beyond Sweden; and Runeberg (1804-77), the poet, who is preferred by many Swedes even to Tegnér. Among still more recent writers are Zakris Topelius and Count Karl Snoilsky, poets; Rydberg, novelist and historian; Struidberg, novelist; and Edgren, dramatist.

Swedenborg, EMANUEL, on whose teachings was founded the New Jerusalem Church (see next art.), was a son of Jesper Swedberg, bishop of West Gothland, and was born at Stockholm in 1688. His studies embraced mechanics, mathematics, mining, chemistry, physiology, and most of the natural sciences. The period 1710 to 1714 he spent in scientific travels through England, Holland, France, and Germany. In 1716 he was appointed assessor extraordinary in the Royal College of Mines by Charles XII., for whom he invented a rolling-machine to transport cannon over the mountains to the siege of Frederickshall. This service, and his treatises on algebra, the value of money, the orbit and position of the earth and planets, and on tides, gained for him the favour of the government, and in 1719 Queen Ulrica raised the Swedberg family to the rank of nobility, upon which occasion the name was changed to Sweden-

borg. In the discharge of the duties of his office he visited the mines of Sweden, of Saxony, and of Austria and Hungary. A work on the origin of things, followed by a treatise on mining and smelting (*Opera Philosophica et Mineralia*), was published in 1734 (3 vols.), and attracted much attention among the scholars of Europe. He increased his stock of knowledge by new travels in 1736-40 in Germany, Holland, France, Italy, and England, and after his return published the *Oeconomia Regni Animalis* (*Economy of the Soul-kingdom*), which contains the application of the system of nature, unfolded in his philosophical works, to man. He was first introduced to an intercourse with the spiritual world in detail, according to his own statement, in 1743 at London. The eyes of his inward man, he says, were opened to see heaven, hell, and the world of spirits, in which he conversed, not only with his deceased acquaintances, but with various distinguished men of antiquity. That he might devote himself more fully to this spiritual intercourse, he resigned, in 1747, his office in the College of Mines; but the king still paid him half his salary as a pension. Latterly he resided much in England and Holland. His theological works, written in Latin between the years 1747 and 1771, found but a limited number of readers; and while he was an object of the deepest veneration and wonder to his few followers, his statements were the more mysterious to the rest of the world because he could not be suspected of dishonesty, and exhibited profound learning, keenness of intellect, and unfeigned piety. His works are very numerous, among the more important of them being the *Arcana Coelestia*, the *True Christian Religion*, the *Apocalypse Explained*, and *Heaven and Hell*. With uninterrupted health he attained the age of eighty-four, and died of apoplexy in London, March 29, 1772.

Swedenborgians, the followers of Swedenborg, and particularly the members of what is called the *New Jerusalem Church*, or *New Church*. This body adopts the doctrinal tenets and method of Biblical interpretation laid down in the writings of Emanuel Swedenborg. The first attempt at organization took place in London in 1783, when John Flaxman, the sculptor, was among its members. The first church for public worship was opened in Eastcheap, London, in 1788. Many of Wesley's preachers about this time adopted the new faith and helped to spread

it widely. Its great apostle, however, was the Rev. John Clowes, rector of St. John's Church, Manchester, who translated most of Swedenborg's writings, and who, while not agreeing that separation from the Establishment was advisable, fostered the many separatist places of worship which sprang up in Lancashire within the sphere of his influence. In 1789 a general conference was held of the various scattered congregations and receivers, which has since 1815 met annually. It possesses one general and and six provincial missionary institutions, a foreign missionary committee, a well-endowed college for the training of students for the ministry, and an orphanage. There are at present between seventy and eighty congregations in Great Britain, nearly seventy of these being in England, over twenty in Lancashire, and ten in London. The registered membership is about 6700, and the moneys held by the conference amount to fully £100,000. In America, where they meet in a general convention, the membership and number of their societies are much greater; and in every foreign country they possess numerous and zealous adherents. The belief of the Swedenborgians is: that Jesus Christ is God, in whom is a trinity not of persons but essentials, answering to the soul, body, and the operation of these in a man; that the Scriptures contain an internal or spiritual meaning, which is the Word existing in heaven; that the key to this is the correspondence between natural and spiritual things, as between effects and their causes; that man is saved by shunning evils as sins and leading a life according to the ten commandments; that man is a spirit clothed with a natural body for life on earth, and then when he puts it off at death he continues to live as before but in the spiritual world, first in an intermediate state between heaven and hell, but afterwards, when his character whether good or evil becomes harmonious throughout, among his like either in heaven or hell; that the Lord's second coming and the last judgment are spiritual events which have already taken place.

Swedish Turnip. See *Turnip*.

Sweepstakes, a gaming transaction, in which a number of persons join in contributing a certain stake, which becomes the property of one or of several of the contributors under certain conditions. Thus, in horse-racing each of the contributors has

a horse assigned to him (usually by lot), and the person to whom the winning horse is assigned gains the whole stakes, or the stakes may be divided between two or three who get the two or three horses first in the race.

Sweet-bay. See *Laurel*.

Sweet-bread. See *Pancræas*.

Sweet-briar, or **SWEET-BRIER** (*Rosa rubiginosa*), a species of rose, a native of Britain, which grows wild, but is often planted in hedges and gardens on account of the sweet balsamic smell of its small leaves and flowers. It is also called the *eglantine*.

Sweet-flag (*Acorus Calāmus*), a plant, also called *Sweet-rush*, found in marshy places throughout the northern hemisphere. The leaves are all radical, long, and sword-shaped; the stem bears a lateral, dense, greenish spike of flowers; the root is long, cylindrical, and knotted. The root has a strong aromatic odour, and a warm, pungent, bitterish taste, and has been employed in medicine since the time of Hippocrates. It is also used by confectioners as a candy, and by perfumers in the preparation of aromatic vinegar, hair-powder, &c.

Sweet-gum, the *Liquidambar styraciflua*. See *Liquidambar*.

Sweet-pea (*Lathyrus odoratus*), a garden plant belonging to the natural order Leguminosæ, and the sub-order Papilionaceæ. It is cultivated on account of the beauty of its flowers, which are sweet-scented, and in colour purple, rose, white, or variegated. Sicily is said to be its native place.

Sweet-potato (*Batatas edulis*; nat. order Convolvulacæ), a plant now cultivated in



Sweet-potato (*Batatas edulis*).

all the warmer parts of the globe. Formerly the roots were imported into England from the West Indies by way of Spain,

and sold as a delicacy. It is the potato of Shakspeare and contemporary writers, the common potato being then scarcely known in Europe. The consumption of the sweet-potato is very large in many parts, including the United States and the warmer parts of America, the East Indies, &c.

Sweet-sop. See *Custard-apple*.

Sweet-william (*Dianthus barbatus*; nat. order Caryophyllaceæ), a species of pink, an old inhabitant of the flower garden, which has produced numerous varieties. It grows wild in dry and sterile places in middle and southern Europe.

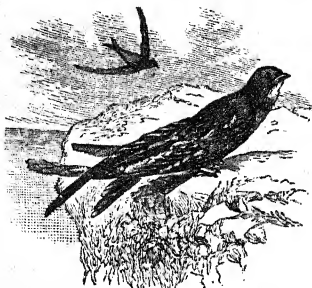
Swell, in music, a gradual increase and decrease of sound; the crescendo and diminuendo combined, marked by the sign $\langle \rangle$. Also an arrangement in an organ (and in some harmoniums) whereby the player can increase or diminish the intensity of the sound at will. In the organ it consists of a series of pipes with a separate key-board, and forming a separate department (called the swell-organ). The loudness or softness of the tone is regulated by opening or shutting, by means of a pedal, a set of slats like a Venetian blind, which forms part of the frame in which the pipes are inclosed.

Sweyn, a king of Denmark, father of Canute the Great. He died in 1014, after having established himself in England, though without being crowned there. See *Denmark* and *Ethelred II.*

Swift, the *Hirundo apus* of Linnæus and *Cypselus apus* or *murarius* of modern ornithologists. Though swifts are like swallows in many respects, their structure is almost

and its scream is very different from the twittering of the swallow. It has the greatest powers of flight of any bird that visits Britain. Its weight is most disproportionately small to its extent of wing, the former being scarcely an ounce, the latter 18 inches, the length of the body being about 8 inches. Its colour is a sombre or sooty black, a whitish patch appearing beneath the chin. It builds in holes in the roofs of houses, in towers, or in hollow trees. It leaves Britain in August, having arrived from Africa early in May. The *C. melba* or *alpinus*, a larger species, with the lower parts dusky white, has its home in the mountainous parts of Central and Southern Europe. A common N. American swift is the so-called chimney swallow (*Chatura pelagica*), which builds its nest in chimneys. (See *Swallow*.) The swifts or swiftlets of the genus *Collocalia*, which inhabit chiefly the islands of the Indian Ocean from the north of Madagascar eastwards, construct the edible birds'-nests which are used by Chinese epicures in the making of soup. See *Birds'-nests*.

Swift, JONATHAN, the greatest of English satirists, the posthumous son of Jonathan Swift, an Englishman, steward of the Irish inns of court, was born in Dublin, November 30, 1667, and was educated at Kilkenny and at Trinity College, Dublin. In 1688 he crossed over to England to pay a visit to his mother, who was residing at Leicester, in her native county, in a state of dependence upon her relations. By her advice he communicated his situation to Sir William Temple, who had married one of her relatives, and who at that time lived in retirement at Moor Park, Surrey. He was received by Sir William into his house as his amanuensis, and was introduced to King William, who often visited Temple privately, and who offered Swift a captaincy of horse, which he declined, having already decided for the church. In July 1692 he graduated as M.A. at Oxford, having entered at Hart Hall in the preceding May. In 1694, conceiving his patron to be neglectful of his interest, he parted from him, with some tokens of displeasure on both sides, and went to Ireland, where he took orders; but he soon returned to Sir William Temple, and remained with him during the few remaining years of that statesman's life. On his death Swift found himself benefited by a pecuniary legacy and the bequest of his papers, which he published with a dedication to the king. In 1699 he accepted an



Common Swift (*Cypselus apus*).

entirely different, and some naturalists rather class them with the humming-birds or the goat-suckers. The swift has all four toes directed forwards; it is larger than the swallow; its flight is more rapid and steady;

invitation from the Earl of Berkeley, one of the lords-justices in Ireland, to accompany him as chaplain and secretary, and was presented by that nobleman with the living of Laracor, where he went to reside in 1700. During his residence there he invited to Ireland Miss Esther Johnson, the lady whom he has rendered celebrated by the name of Stella, and with whom he had become acquainted in the house of Sir William Temple, her mother being a companion to Lady Gifford, the sister of Sir William. Miss Johnson, at this time about nineteen years of age, was accompanied by a Mrs. Dingley; and the two ladies resided in the neighbourhood when Swift was at home, and at the parsonage house during his absence. In 1701 he took his doctor's degree, and in 1704 he published anonymously his famous *Tale of a Tub*, to which was appended the *Battle of the Books*. In 1708 appeared, among other things, an attack upon astrology under the title of *Predictions for the Year 1708*, by Isaac Bickerstaff, Esq., and in 1709 a *Project for the Advancement of Religion*, dedicated to Lady Berkeley, the only work to which he ever put his name. In 1710 he was in London, being engaged by the Irish prelate to obtain a remission of the first-fruits and twentieths, payable by the Irish clergy to the crown, and was introduced to Harley, afterwards Earl of Oxford, and to Secretary St. John, subsequently Lord Bolingbroke. He overtly joined the Tory party, and several political tracts appeared from his pen. The two most famous of these were *The Conduct of the Allies* (1711) and *The Barrier Treaty* (1712), which did immense service to the Tories, preparing the mind of the country for the peace which the ministers were then anxious to bring about. A bishopric in England was the object of his ambition; but the only preferment he obtained from his ministerial friends was the Irish deanery of St. Patrick's, to which he was presented in 1713. The dissensions between Oxford and Bolingbroke, whom he in vain attempted to reconcile, and the death of the queen, which soon followed, put an end to his prospects, and condemned him to unwilling residence for life in a country which he disliked. In 1716 he is said to have been privately married to Miss Johnson; but this is doubted. In 1712 he had become acquainted in London with Miss Hester Vanhomrigh (Vanessa), a lady of fortune, with a taste for literature, in which it was a pleasure to him to give

her instruction. The pupil became enamoured of her tutor, and even proposed marriage to him; but he avoided a decisive answer. Miss Vanhomrigh died in 1723, of shock, it is said, at discovering his secret union with Stella. His *Proposal for the Universal Use of Irish Manufactures* (1720) and his celebrated *Drapier's Letters* (1723) made him the idol of the Irish people. His famous *Gulliver's Travels* appeared in 1726. After the death of Stella, which took place in 1728, his life became much retired, and the austerity of his temper increased. He continued, however, earnest in his exertions to better the condition of the wretched poor of Ireland; in addition to which he dedicated a third of his income to charity. Latterly the faculties of his mind decayed, and by 1742 had entirely given way. He died in 1745, bequeathing the greatest part of his fortune to an hospital for lunatics and idiots. Swift's character was marked by many noble qualities, but was stained by excessive pride, implacability, misanthropy, and general indifference to the feelings of others. As a writer he has, perhaps, never been exceeded in grave irony, which he veils with an air of serious simplicity, admirably calculated to set it off. He abounds in ludicrous ideas, which often deviate, both in his poetry and prose, into very unpardonable grossness. His style forms a fine example of easy familiarity.

SWILLY, LOUGH, an inlet of the Atlantic in the north of Ireland, which penetrates the county of Donegal for about 25 miles. It is a fine expanse of great depth, with an average width of 3 miles, but is not much frequented by ships.

Swimming, the act or art of sustaining and propelling the body in water. A large proportion of the animal tribes are furnished with a greater or less capacity for swimming either in water or on its surface, but man is unqualified for swimming without learning to do so as an art. The art of swimming chiefly consists in keeping the head, or at least the mouth, above water, and using the hands and feet as oars and helm. It forms a most healthful, invigorating, and agreeable exercise, and the means which it affords of preserving our lives or those of others in situations of peculiar peril is also a great recommendation of this exercise, which may be easily learned wherever there is water of 5 feet depth. Want of confidence is the greatest obstacle in the way of most who begin to learn swimming. The beginner

cannot persuade himself that the water will support him, and with the feeling that some muscular effort is necessary for the purpose stiffens his back in such a way that the water cannot buoy him up with the head above water. If, instead of doing this, he would give up the endeavour to support himself by a muscular strain, and trust to the water to support him like a cushion, the art of swimming would come to him almost as naturally as the art of walking does to a child. When the ability to swim in the ordinary way, chest downwards, is acquired, everything is acquired. It is as unnecessary to give special instructions for swimming on the back, on the side, &c., as it is to direct people who are able to walk how to turn themselves or walk up or down hill. In saving a person from drowning, which can be done most effectually if he has already lost consciousness, pull him by the hair, or push him before you, if far from shore; otherwise take him by the arm. An excellent method of supporting another in the water is to allow the person supported to rest his hands on your hips. This method can scarcely be practised in cases where persons unable to swim are drowning; but it may be of much avail in supporting a brother swimmer who is attacked with weakness or cramp, and who has presence of mind to take advantage of the support. Several feats of modern swimming have been placed on record, the most famous of all being that of Matthew Webb, of the British mercantile marine service, who swam from Dover to Calais on August 24-25, 1875, in 21 h. 44 m. 55 s., a distance of 39½ miles. Capt. Webb, who has never been approached as a long-distance swimmer in ocean and tidal waters, lost his life in an attempt to swim the whirlpool rapids of Niagara on July 24, 1883. Some recent attempts to swim the Straits of Dover have nearly succeeded, but Webb's feat still remains unique.

Swimming-bladder, AIR-BLADDER, or SOUND (of fishes), the names applied to a sac or bladder-like structure found in most, but not in all fishes, the chief office of which appears to consist in altering the specific gravity of the fish, and thus enabling it to rise or sink at will in the surrounding water. It has a *homology* or structural correspondence with the *lungs* of higher forms than fishes; but it has no *analogy* or *functional* correspondence with the lungs or breathing organs, save in the peculiar *Lepidosirens* (which see) or mud-fishes, in which the air-bladder

becomes cellular in structure, and otherwise assumes a lung-like structure and function. In its simplest condition it exists as a closed sac lying beneath the spine, and containing air or gases of different kinds. By the muscular compression of its walls the density of the contained gas is altered, and the specific gravity of the fish affected accordingly, so as to change its position in the water. In most sea-fishes the gas which the swimming-bladder contains is oxygen, that in the air-sac of fresh-water fishes being mostly nitrogen. Such fishes as the flat-fishes, represented by the flounders, soles, &c., have no swimming-bladder developed, and it may be absent in other forms, such as sharks, rays, lampreys, &c.

Swinburne, ALGERNON CHARLES, an eminent English poet, son of Admiral Swinburne, was born in London 1837, and educated at Balliol College, Oxford. His first productions, *Queen Mother* and *Rosamond*, published in 1861, attracted but little attention. They were followed by two tragedies, *Atalanta in Calydon* (1864), and *Chastelard* (1865), whose merits were speedily recognized, and by *Poems and Ballads* (1866), also admired, but attacked on the score of indecency. His many subsequent works include: *A Song of Italy* (1867); *William Blake*, a critical essay (1867); *Songs before Sunrise* (1871); *Bothwell*, a tragedy (1874); *Poems and Ballads* (2nd series, 1878); *Mary Stuart*, a tragedy (1881); *Tristram of Lyonesse*, &c. (1882); *A Century of Roundels* (1883); *Marino Faliero*, a tragedy (1885); *Poems and Ballads* (3rd series, 1889); *Astrophel* and other *Poems* (1894); *Tale of Balen* (1896); *Rosamund*, *Queen of the Lombards*, a tragedy (1899); also essays and studies on *Shakspeare*, *Charlotte Brontë*, *Hugo*, &c. He died in 1909.

Swindon, a mun. borough of England, in the county of Wilts, 77 miles west of London. It consists of Old Swindon and New Swindon. Old Swindon is a picturesque old place, known in *Domesday* as *Swindune*. New Swindon originated in the establishment here, in 1841, of the locomotive works of the Great Western Railway, which now employ some 12,000 hands. Pop. 45,006.

Swine. See *Hog*.

Swine Fever, or SWINE PLAGUE, is known as hog cholera in America, where it has caused enormous losses. It is a specific contagious fever, generally very rapid in its course, death ensuing in a very few days. To suppress the disease, all affected pigs must

be killed, and if necessary those which have been in contact with them, and the carcasses and litter burned or deeply buried.

Swine-fish, a name given to the *Anarhichas lupus* or sea-wolf (which see).

Swinemünde (swi'né-mün-dé), a seaport of Prussia, province of Pomerania, on the island of Usedom, at the mouth of the Swine, 36 miles N.N.W. of the town of Stettin, of which it is the foreport. The harbour, which is strongly fortified, is one of the best on the Prussian Baltic coast. The light-house is the loftiest in Germany. Swinemünde is much frequented for sea-bathing. Pop. 13,200.

Swiney Lectures, founded by George Swiney, M.D., an eccentric gentleman, who died in London in 1844, and who, by his will, bequeathed to the trustees of the British Museum the sum of £5000 for the purpose of establishing a lecture on geology and astronomy alternately, with the view of promoting 'religion and goodness.' The lectures are now devoted to geology, and the lecturer must be a graduate of Edinburgh University. He is appointed for five years, receives a fee of £144 a year, and has to deliver not less than twelve lectures annually, at such public place as the Museum trustees shall approve.

Swing-bridge, called also swivel-bridge and pivot-bridge, a bridge that may be moved by swinging, so as to afford a passage for ships on a river, canal, at the mouth of docks, &c. In one form the whole bridge is swung to one side; in another it rotates from its centre on a pier in the middle of the waterway, so as to make a passage on each side of it; while in a third it consists of two sections, each of which, when opened, is landed on its own side.

Swinton, a town of England, in the West Riding of Yorkshire, 10 miles north-east of Sheffield. It is an industrial place, with pottery-works, glass-works, iron-works, coal-mines, &c. Pop. 12,217.

Swiss Guards, bodies of mercenary Swiss troops which, since Switzerland gained her independence in the 15th century, have been employed in many European countries as body-guards, and for duty about courts. The most famous are the French Swiss Guards organized in 1616, and annihilated in the defence of the Tuileries, August 10, 1792, whose heroism is commemorated in Thorwaldsen's colossal Lion, carved in the face of a rock at Lucerne. The French Swiss Guards were reorganized by Louis

XVIII. in 1815, and defeated and dispersed in the revolution of 1830.

Switches. See *Railways*.

Swithin, St., bishop of Winchester from 852 to 862, and patron saint of Winchester Cathedral from the 10th to the 16th century. The popular knowledge of this saint's name is due to the belief that if rain falls on the 15th of July (which is popularly known as St. Swithin's Day) it will rain for six weeks after. Similar superstitions are connected in various continental countries with other saints' days which occur in summer.

Switzerland (German, *Schweiz*; French, *Suisse*), a federal republic of Central Europe, bounded north by Baden, from which it is separated for the most part by the Rhine; north-east by Württemberg and Bavaria, from which it is separated by the Lake of Constance; east by the principality of Lichtenstein and the Tyrol, from which it is separated by the Rhine and the Grisons Alps; south by Italy, from which it is separated by the Alps and the Lake of Geneva; and west and north-west by France, from which it is separated in part by the Jura Mountains and the River Doubs. Greatest length, 210 miles; greatest breadth, 126 miles. The federal cantons of which it consists, with their areas and populations, are as follows:—

Cantons.	Area in sq. m.	Population, Dec. 1900.
Aargau (Fr. Argovie).....	542	206,460
Appenzell.....	162	68,764
Basel (Fr. Bâle).....	177	180,097
Bern (Fr. Berne).....	2,690	586,918
Freiburg (Fr. Fribourg)....	644	127,719
Gall, St. (Ger. Sankt Gallen)	780	230,066
Geneva (Fr. Genève; Ger. Genf)	109	181,674
Glarus (Fr. Glaris).....	267	32,397
Grisons (Ger. Graubünden)...	2,774	104,510
Lucerne (Ger. Luzern).....	580	146,474
Neuchâtel (Ger. Neuenburg)	312	125,804
Schaffhausen (Fr. Schaffhouse)	116	41,523
Schwyz (Fr. Schwytz).....	351	55,497
Solothurn (Fr. Soleure).....	303	100,338
Ticino (Ger. and Fr. Tessin).	1,095	142,719
Thurgau.....	382	113,110
Unterwalden.....	295	28,368
Uri.....	415	19,701
Valais (Ger. Wallis).....	2,026	114,980
Vaud (Ger. Waadt).....	1,245	270,152
Zug.....	92	25,045
Zürich.....	665	430,135
Total.....	15,992	3,292,551

The largest towns are Zürich, Basel, Geneva, and Bern, the last being the federal capital.

Physical Features.—The characteristic

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physical features of Switzerland are its lofty mountain ranges, enormous glaciers, magnificent lakes, and wild romantic valleys. The loftiest mountain-chains belong to the Alps, and are situated chiefly in the south. The central nucleus is Mount St. Gothard, which unites the principal watersheds of Europe, and sends its waters into four large basins—north by the Rhine to the German Ocean, south-west by the Rhone to the Mediterranean, south-east by the Po to the Adriatic, and east by the Danube to the Black Sea. In like manner it forms a kind of starting-point for the loftiest ranges of the Alps—the Helvetic or Lepontine Alps, to which it belongs itself; the Pennine Alps, which include Mont Blanc, the culminating point of Europe, extending beyond the Swiss frontiers into Savoy; and the Rhetian Alps, which stretch east and north-east across the canton of Grisons into the Tyrol. North of the Alps is the chain of the Jura, and between the two is a sort of upland plain or wide irregular valley, the most populous part of the country.

Rivers and Lakes.—Owing to the mountainous nature and inland position of the country none of the rivers acquire such a size within its limits as to become of much navigable importance. The Rhine, formed by two head-streams in the canton of Grisons, flows north into the Lake of Constance, and thence west to Schaffhausen, where it forms the celebrated falls of that name. Below these falls its navigation properly begins. Its principal affluent in Switzerland is the Aar. The Rhone, rising in the Rhone glacier (Valais), flows north-west into the Lake of Geneva. Immediately after issuing from the lake at the town of Geneva it receives the Arve, and about 10 miles below quits the Swiss frontier. The waters which the Po receives from Switzerland are carried to it by the Ticino; those which the Danube receives are carried to it by the Inn. The largest lakes, that of Geneva in the south-west and of Constance in the north-east, as well as that of Maggiore on the south side of the Alps, belong partly to other countries; but within the limits of Switzerland, and not far from its centre, are Lake Neuchâtel, with Morat and Bienné in its vicinity, Thun with its feeder Brienz, Lucerne or Vierwaldstätter-see, Sempach, Baldegg, Zug, Zürich, and Wallenstätter-see. All these internal lakes belong to the basin of the Rhine.

Geology and Minerals.—All the loftiest

alpine ranges have a nucleus of granite, on which gneiss and mica-slate recline generally at a high angle. Coal-bearing strata are found in the cantons of Valais, Vaud, Freiburg, Bern, and Thurgau, and brown coal is obtained in St. Gall and Zürich. Iron is worked to advantage in several quarters, particularly among the strata connected with the Jura limestone. Rock and common salt are produced to some extent in the cantons of Vaud, Basel, and Aargau. The only other minerals deserving of notice are alabaster and marble, widely diffused; and asphalt, in the Val-de-Travers in the canton of Valais. Mineral springs occur in many quarters.

Climate, Agriculture, &c.—Owing to differences of elevation the climate is extremely variable even in the same localities. Owing to the same cause, few countries in Europe even of larger extent can boast of a more varied vegetation than Switzerland. In regard to vegetation it has been divided into seven regions. The characteristic product of the first is the vine, which grows up to 1700 or 1800 feet above the sea-level. The next is the hilly or lower mountain region, rising to the height of 2800 feet, and characterized by the luxuriance of its walnut-trees, with good crops of spelt and excellent meadows. The third or upper mountain region, which has its limit at 4000 feet, produces forest timber, more especially beech, and has good crops of barley and oats, and excellent pastures. Above this, and up to the height of 5500 feet, is the fourth or subalpine region, distinguished by its pine forests and maples; here no regular crops are grown. The fifth or lower alpine region, terminating at 6500 feet, is the proper region of alpine pastures. In the sixth or upper alpine region the vegetation becomes more and more stunted, and the variation of the seasons is lost. The seventh or last region is that of perpetual snow. Many parts even of the lower regions of Switzerland are of a stony, sterile nature, but on every side the effects of persevering industry are apparent, and no spot that can be turned to good account is left unoccupied. Of the total area, over 28 per cent is unproductive; of the productive area nearly 36 per cent is under grass and meadows. The chief crops are wheat, spelt, rye, oats, and potatoes. The wine produced is mostly of inferior quality. Considerable quantities of fruits are grown. Among domestic animals the first place belongs to the horned cattle, and the dairy

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products of Switzerland are of special commercial importance, great quantities of cheese and condensed milk being exported. On the higher grounds goats are very numerous. Among wild animals are bears, wolves, chamois, wild boars, badgers, foxes, otters, large birds of prey, &c. The lakes and rivers are well supplied with fish.

Manufactures and Trade.—Of the population about 40 per cent are dependent on agriculture, and about 34 per cent on manufacturing industry. Switzerland is thus mainly an agricultural and manufacturing country. The system of peasant proprietorship prevails largely, it being estimated that there are nearly 300,000 peasant proprietors. The chief manufactures embrace cotton, silk, embroidery, watches and jewelry, machinery and iron goods, tobacco, and wool. Geneva is the chief seat of the watch industry, Basel of the silk industry, and St. Gallen of embroidery. Switzerland being an inland country, has direct commercial intercourse only with the surrounding states; but the trade with other countries, including Great Britain and the United States, is very important. The annual imports for home consumption are valued at about £60,000,000, and the exports at £40,000,000. There are now about 2900 miles of railway. There is a very complete system of telegraphs. The French metric system of money, weights, and measures has been adopted in Switzerland.

Religion and Education.—Both the Evangelical-reformed church and the Roman Catholic are national churches in Switzerland, about 59 per cent of the inhabitants belonging to the former, and 40 per cent to the latter. There is complete liberty of conscience and creed, but the order of the Jesuits and the societies affiliated to it are not allowed within the confederation. In terms of the constitution of 1874 primary education is secular and compulsory throughout the confederation. For the higher education there are six universities, Basel, Zürich, Geneva, Berne, Freiburg, Lausanne, the first founded in 1460, and the others since 1832. There is also an academy or incomplete university at Neuchâtel, a polytechnic school at Zürich, and a military academy at Thun.

Government and Finance.—The cantons of Switzerland are united together as a federal republic for mutual defence, but retain their individual independence in regard to all matters of internal administration. The legislative power of the confederation be-

longs to a federal assembly, and the executive power to a federal council. The federal assembly is composed of two divisions—the national council, and the state council or senate. The national council is elected every three years by the cantons—one member to each 20,000. Every lay Swiss citizen is eligible. The senate consists of forty-four members—two for each canton. In addition to its legislative functions the federal assembly possesses the exclusive right of concluding treaties of alliance with other countries, declaring war and signing peace, sanctioning the cantonal constitutions, and taking measures regarding neutrality and intervention. The referendum and initiative form part of the federal constitution and also of the constitutions of most of the cantons. (See *Referendum*.) The federal council consists of seven members elected for three years by the federal assembly, every citizen who has a vote for the national council being eligible for becoming a member of the federal council. The seven members of the federal council act as chiefs of the seven administrative departments of the republic. The president and vice-president of the federal council are the chief magistrates of the republic. They are elected by the federal assembly for one year, and are not eligible for re-election till after the expiry of another year. The federal tribunal, consisting of fourteen members elected for six years by the federal assembly, decides in all disputes between the cantons, or between the cantons and the confederation, and acts in general as a high court of appeal. It is divided into a civil and a criminal court. The annual revenue and expenditure each amounts to about £5,000,000, and the public debt stands at £4,000,000. As a set-off against the public debt there is property belonging to the state worth twice as much.

Army.—The army consists of the Bundesauszug, or federal army, comprising all men able to bear arms from the age of twenty to thirty-two; and the Landwehr, or militia, comprising all men from the age of thirty-two to forty-four. In 1906 the Bundesauszug had a strength of 142,999, and the Landwehr of 91,809, making a total of 234,808. There is also, by a law of 1887, a Landsturm (of 303,091 men), in which every citizen between the ages of seventeen and fifty, not otherwise serving, is liable to be called to serve. The Landsturm is called out only in time of war.

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People.—The Swiss are a mixed people as to race and language. German, French, Italian, and a corrupt kind of Latin called Rhaetian or Roumansch, are spoken in different parts. German is spoken by the majority of inhabitants in fifteen cantons, French in five, Italian in one (Ticino), and Roumansch in one (the Grisons). Of the total population 71·4 per cent speak German, 21·7 per cent French, 5·3 per cent

Italian, and 1·2 per cent Roumansch. The Swiss, however, have lived so long in a state of confederation that, apart from these peculiarities of origin and language, they have acquired a decided national character, and may now be viewed as forming a single people.

History.—The oldest inhabitants mentioned in written history are the Helvetians, who, between 58 B.C. and 10 A.D., were subjugated by the Romans. (See *Helvetii*.)



Group of Swiss, District of Appenzell.

Before the fall of the Roman Empire in the West, Switzerland was occupied by the German confederation of the Alemanni; by the Burgundians and the Lombards; and by the year 534, under the successors of Clovis, it had become a portion of the Frankish Empire. Under the successors of Charlemagne it was divided between the Kingdom of France and the German Empire, but ultimately the whole country fell to Germany. For the most part, however, the dependence of Switzerland on Germany was merely nominal. The counts (originally local governors) conducted themselves as princes, assumed the name of their castles, and compelled the free inhabitants of their *Gaus* (districts) to acknowledge them as their lords. At the beginning of the 13th century the three forest cantons of Uri, Schwyz, and Unterwalden were subject to the counts of Hapsburg, who, although they were properly only imperial bailiffs (*Vögte*), yet re-

garded themselves as sovereign rulers. This claim the three cantons constantly refused to admit, and eventually (1291) leagued themselves together to oppose the usurpations of the house of Hapsburg. Tradition says that on the night of Nov. 7, 1307, thirty-three representatives, with Fürst of Uri and his son-in-law Tell, Stauffacher of Schwyz, and Arnold of Melchthal in Unterwalden at their head, met at Rütli, a solitary spot on the Lake of Lucerne, swore to maintain their ancient independence, and projected a rising of these cantons for the 1st of January, 1308. On the day fixed the rising took place, and the Austrian governors were deposed and expelled. But the events related of Tell are purely legendary. (See *Tell*.) A few years later the three cantons were invaded by the Hapsburgs; but the signal victory at the pass of Morgarten on the 15th of Nov. 1315, secured the independence of the cantons. The three united

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cantons were joined by the cities of Lucerne (1332) and Zürich (1351), the cantons of Glarus and Zug (1352), and the city of Bern (1353). Austria, which claimed jurisdiction over three of the newly-added members, namely, the city of Lucerne and the cantons of Glarus and Zug, again invaded the territory of the confederation, but was completely defeated at Sempach (where Arnold of Winkelried is said to have sacrificed his life for the sake of his fellow-countrymen) in 1386, and in 1388 at Näfels. The canton of Appenzell joined the confederation in 1411, and Aargau was wrested from the Austrians in 1415. The third war with Austria terminated in 1460, in favour of the confederation, which obtained Thurgau, Austria being thus deprived of all its possessions in the regions over which Switzerland now extends. In 1474, at the instigation of Louis XI. of France, the Swiss turned their arms against Charles of Burgundy, invading his country and defeating his army near Héricourt. Charles, in revenge, invaded Switzerland, but the Swiss were again completely victorious, and inflicted several defeats upon the Burgundians at Granson in Vaud and at Murten (Morat) in Freiburg in 1476, and at Nancy in 1477, where Charles was slain. They admitted Freiburg and Solothurn into the confederation in 1481, and about the same time they concluded defensive alliances with several of the neighbouring states. Their prosperity rose to such a height that all the courts around, even Austria, sought their friendship and alliance. The last war with Austria broke out in 1498. The Swiss had to undergo a severe struggle, but, victors in six sanguinary battles, they were, by the Peace of Basel in 1499, practically separated from the empire, a separation to which formal and international sanction was given in 1648. After this war they had no longer any enemy to fear, and their future wars were waged on behalf of foreign powers. In 1501 Basel and Schaffhausen, and in 1513 Appenzell (which had long been an ally), were admitted into full federation. The number of the cantons was thus brought up to thirteen, at which it remained till 1798. The town and the abbot of St. Gall and the town of Bienne had seats and votes in the diet without being in full federation; and there were besides six allies of the confederation not enjoying these privileges—the Grisons, Valais, Geneva, Neuchâtel, Mülhausen, and the bishopric of Basel.

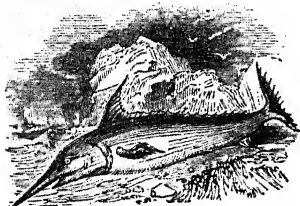
In 1516 France gave up to Switzerland the whole of the present canton of Ticino.

In 1518 the Reformation began to make its way into Switzerland, chiefly through the efforts of Zuinglius at Zürich. Zuinglius fell at Kappel (1531), but his work was carried on by Calvin at Geneva. The effect of the Reformation for long was to divide Switzerland into separate camps. Aristocracy and democracy, Protestantism and Catholicism, struggled for the superiority. Internal dissensions, religious and political, continued for nearly two hundred years. The last time the two great parties met in arms was at Willmergen in 1712, when victory declared itself for the Protestants. The period of tranquillity that followed was alike favourable to the progress of commerce, agriculture, and manufactures, and to the arts and sciences. In almost every department of human knowledge the Swiss of the 18th century, both at home and abroad, acquired distinguished reputation, as the names of Haller, Bonnet, Bernoulli, J. J. Rousseau, Lavater, Bodmer, Breitinger, Gessner, Sulzer, Hirzel, Fuseli, Hottinger, Johann von Müller, Pestalozzi, and many others witness. In the last years of the century the ferment of the French revolution spread to Switzerland; and in 1798 the ancient confederation was replaced by the Helvetic Republic, which lasted four years. In 1803 Napoleon I. organized a new confederation, composed of nineteen cantons, by the addition of Aargau, Grisons, St. Gall, Ticino, Thurgau, and Pays de Vaud. In 1815, by the compact of Zürich, Neuchâtel, Geneva, and Valais were admitted into the confederacy, and the number of the cantons was thus brought up to twenty-two. This confederacy was acknowledged by the Congress of Vienna, which proclaimed the perpetual neutrality of Switzerland, and the inviolability of its soil. In 1847 a separatist league of seven Catholic cantons (the Sonderbund) had to be dissolved by force of arms, and next year a new federal constitution was introduced. During the commotions of 1848 Neuchâtel set aside its monarchical form of government and adopted a republican one, and in 1857 it was put upon the same footing with the other cantons. Since that time the annals of Switzerland have little to record beyond the fact of constant moral and material progress. A revision of the federal constitution was adopted after a protracted agitation on the 19th of April, 1874, giving

to the federal authorities more power in matters relating to law, the army, the church, and education.

Sword, a weapon used in hand-to-hand encounters, consisting of a steel blade and a hilt or handle for wielding it. The blade may be either straight or curved, one-edged or two-edged, sharp at the end for thrusting, or blunt. The ancient Greek swords were of bronze, and later of iron. The Romans in the time of Polybius (B.C. 150) had short, straight swords of finely-tempered steel. The straight, long sword was used by the Christians of the West in the middle ages, while the Poles and all the tribes of Slavonic origin employed, and still prefer, the crooked sword or scimitar, which was also used by the Saracens, and is still the common one in the East. The double-handed sword of the middle ages was an unwieldy weapon, and probably originated from the wearing of plate armour. The sword is of much less importance in warfare than formerly, but European cavalry are still armed with it. From the former importance of the sword it came to be connected with various matters of ceremonial. The sword of state is one of the regalia, and the 'offering of the sword' one of the ceremonies of coronation. Damascus, Toledo, and Milan were anciently famous for their sword-blades. In England, at the present day, the principal seat of the sword manufacture is Birmingham. See *Broadsword*, *Cutlass*, *Rapier*, *Sabre*, *Scimitar*; also *Arms and Armour*, *Fencing*.

Sword-fish, a fish allied to the mackerel and represented by the common sword-fish (*Xiphias gladius*), the single known species. It occurs in the Mediterranean Sea and At-



Sword-fish (*Xiphias gladius*).

lantic Ocean, but may also be occasionally found round the coasts of Britain. It attains a length of from 12 to 15, or even 20 feet, the elongated upper jaw, or sword, forming three-tenths of its length. Its body is covered with minute scales. Its colour is

a bluish-black above, and silvery white on the under parts. The ventral fins are wanting. It is fished for by the Neapolitan and Sicilian fishermen with the harpoon. Its flesh is very palatable and nutritious. It attacks other fishes, and often inflicts fatal wounds with its powerful weapon; and there are frequent instances in which the timbers of ships have been found to be perforated through and through by the sword-like jaw, which has been left sticking in the wood.

Syb'aris, an ancient Greek city of Lower Italy, on the Gulf of Tarentum, supposed to have been built by a colony of Achæans and Troezenians about 720 B.C. It rapidly rose to an extraordinary degree of prosperity, and the inhabitants were in ancient times proverbial for their luxury and voluptuousness. It was totally destroyed by the Crotonians, who turned the waters of the river Crathis against it (510 B.C.).

Sybel (zē'bl), HEINRICH VON, German historian, was born at Düsseldorf in 1817, studied at Berlin under Ranke, and became successively professor of history at Bonn, Marburg, Munich, and Bonn again. In 1875 he became director of the Prussian state archives at Berlin, and member of the Academy of Science. He died in 1895. He is best known in England by his *History of the French Revolution*.

Sycamine. Same as *Sycamore*.

Sycamore, a European species of maple (*Acer pseudoplatanus*), a large and well-known timber tree (called *plane* in Scotland); also, in the western parts of the U. States, a name for the occidental plane or buttonwood. See *Maple* and *Plane-tree*. For the sycamore of Scripture see *Sycamore*.

Sycee-silver, the fine silver of China, cast into ingots weighing commonly rather more than 1 lb. troy. They are marked with the seal of some banker or assayer as a guarantee of purity.

Sychar (sī'kār). See *Shechem*.

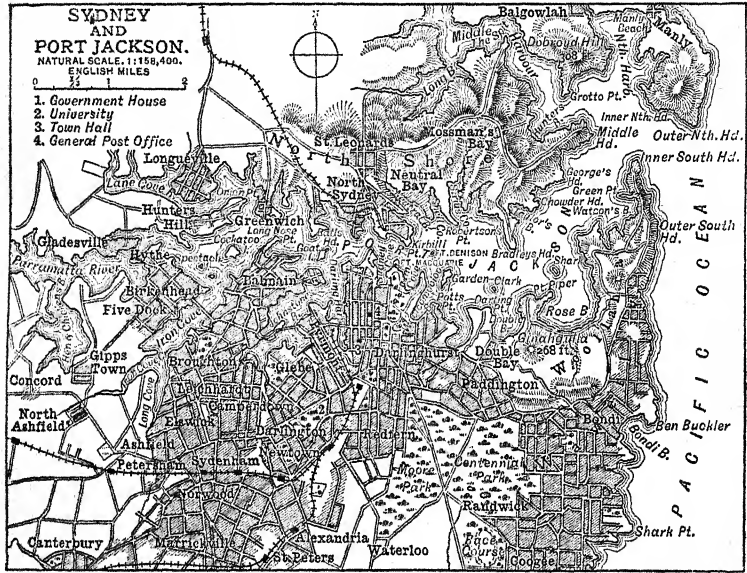
Sycamore, a tree of the genus *Ficus*, the *F. Sycomorus*, or sycamore of Scripture, a kind of fig-tree. It is very common in Palestine, Arabia, and Egypt, growing thick and to a great height, and though the grain is coarse, much used in building, and very durable. Its wide-spreading branches afford a grateful shade in those hot climates, and its fruit, which is produced in clusters upon the trunk and the old limbs, is sweet and delicate.

SYCOSIS—SYDNEY.

Syco'sis, a pustular eruption on the chin, upper lip, or sides of the head, among the hairs, in the follicles of which the pustules have their chief seat.

Sydenham (sid'n-ham), a district in the county of London, 6 miles s.s.e. of London Bridge. Originally a village with mineral springs of some note, it was selected as the site of the Crystal Palace, opened in 1854. Pop. 43,630. See *Crystal Palace*.

Sydenham, THOMAS, English physician, was born in Dorsetshire in 1624, took the degree of bachelor of medicine at Oxford in 1648, and died in 1689. He commenced practice as a physician at Westminster, and applied himself to an attentive observation of the phenomena of diseases. Febrile disorders and the gout attracted his especial notice. The Sydenham Society, which owes its name to him, have published an Eng-



lish translation of his works, which were all written in Latin.

Sydney, the capital of New South Wales and the parent city of Australia, is picturesquely situated on the southern shore of Port Jackson, the shore line being deeply indented by capacious bays or inlets which form harbours in themselves, and are lined with wharves, quays, and warehouses. Some of the older streets are narrow and crooked, bearing a striking resemblance to those of an English town; but the more modern streets, such as George Street, Pitt Street, Market Street, King Street, and Hunter Street, rank high in order of architectural merit. The steam tramway system is extended to all parts of the suburbs, and water communication between the city and its transmarine suburbs, Balmain, North Syd-

ney, Greenwich, &c., is maintained by numerous steam-ferries. Among the most important public buildings are the new government offices, magnificent white freestone structures in the Italian style; the town-hall, with a tower 156 feet high, and a great hall with a huge organ; the post-office, an Italian building with a tower 250 feet high; state governor's house; the university, a Gothic building with a frontage of nearly 400 feet, situated in a fine park; the free public library; school of art; public museum; grammar-school; St. Andrew's (Episcopal) Cathedral; St. Mary's (R.C.) Cathedral; the Jewish synagogue; exchange; custom-house; mint; parliament houses; Queen Victoria markets, with dome 190 feet high; imposing central railway-station; hospitals, asylums, and numerous other

ecclesiastical, scholastic, and business buildings, equal to those of older countries. The city is lighted with gas and electricity, there being large public works for electric supply. The recreation grounds include the Domain, a beautiful park covering about 140 acres; Hyde Park, 40 acres, near the centre of the city; the Botanical Gardens, the finest in the colonies, 38 acres; Moore Park, 600 acres; the Centennial Park, designed to commemorate the colony's centenary (1888), 768 acres; and the race-course, 202 acres. The entrance from the Pacific Ocean to Port Jackson, about 4 miles north-east of Sydney, is 1 mile in width, and is strongly fortified; the bay itself is about 10 miles in length and 3 in average breadth; it is well sheltered, and has a depth of water sufficient to float the largest vessels. Besides wharves and quays there are dry-docks and other accommodation for shipping, and the trade of the port is very large. The principal exports are wool, tallow, hides, preserved meat, tin, copper, &c.; the imports, grain, tea, coffee, sugar, wine and spirits, ironware and machinery, cotton and woollen goods, wearing apparel, furniture, &c. Sydney was founded in 1788, and was named in honour of Viscount Sydney, the colonial secretary. It was incorporated in 1842. The discovery of gold in the colony in 1851 gave an immense impetus to its progress. Pop. (1881), 99,670; including suburbs, 220,427; in 1901, 488,382.

Sydney, a town of Canada, capital of Cape Breton county, Nova Scotia, on Cape Breton Island, on the south-west arm of Sydney harbour, is a prosperous coal-exporting town, with steel-works, shipbuilding, and an excellent harbour. It is connected by rail with North Sydney and other coal-mining centres, and steamers ply to Halifax, North Sydney, Sydney Mines (both on Sydney harbour), and other ports. Pop. 9909; N. Sydney, 4646; Sydney Mines, 3192.

Sydney, ALGERNON and SIN PHILIP. See *Sidney*.

Syene (sī-ē'nē). See *Assouan*.

Syenite, a rock composed of hornblende and orthoclase felspar with occasionally a little quartz. It abounds in Upper Egypt, near Assouan, the ancient Syene, whence it derives its name. It often bears the general aspect of a granite, but is distinguished from that rock by the presence of hornblende and the comparative absence of quartz and mica. Granite which contains hornblende is called *syenitic granite*, and fine-grained

syenite, containing large crystals of felspar, is called *syenitic porphyry*.

Sylhet. See *Silhet*.

Sylla. See *Sulla*.

Syllabus, a document issued by Pope Pius IX., Dec. 8, 1864, which condemned eighty current doctrines of the age as heresies. The syllabus reasserts all the claims of the mediæval papacy. It has provoked conflicts between the papal and the civil power in Prussia, Austria, and Brazil.

Syllogism, in logic, a form of reasoning or argument, consisting of three propositions, of which the two first are called the *premises*, and the last the *conclusion*. In this form of argument the conclusion necessarily follows from the premises; so that if the two first propositions are true the conclusion must be true, and the argument amounts to demonstration. Thus, plants have not the power of locomotion; an oak is a plant; therefore an oak has not the power of locomotion. These propositions are denominated the major premise, the minor premise, and the conclusion. The three propositions of a syllogism are made up of three ideas or terms, and these terms are called the *major*, the *minor*, and the *middle*. The subject of the conclusion is called the minor term (oak); its predicate is the major term (the power of locomotion); and the middle term is that which shows the connection between the major and minor term in the conclusion, or it is that with which the major and minor terms are respectively compared (plants). Syllogisms are usually divided into categorical, hypothetical, disjunctive, &c. The *quantity* and *quality* of propositions in logic—that is, whether they are said of all generally or only of some, and whether they are affirmative or negative—are marked by arbitrary symbols, as A, E, I, O. Every assertion may be reduced to one of four forms—the universal affirmative, marked by A; the universal negative, marked by E; the particular affirmative, marked by I; and the particular negative, marked by O. Examples of each of these are: All men are liable to err; no man is the exact counterpart of another; some men are wise; some men are not wise. From these, by combination, all syllogisms are derived. The rules of the syllogism may be thus briefly expressed: (1) In every syllogism there must be three and only three terms. (2) The middle term must enter universally (that is, inclusively or exclusively of a whole class) in one of the pre-

mises. (3) Neither the minor term nor the major must be used universally in the conclusion if not so used in the premises. (4) If both premises are affirmative the conclusion must be affirmative. (5) If either premise is negative the conclusion must be negative. (6) From two negative premises no conclusion can be drawn.

Sylphs, the elemental spirits of the air in the system of Paracelsus. The sylphs, like the other elemental spirits—the salamanders or spirits of fire, the gnomes or spirits of earth, and the undines or spirits of water—form the link between immaterial and material beings. They have many human characteristics, are male and female, and are mortal, but have no soul, and consequently suffer annihilation after death.

Sylt, an island in the North Sea, off the coast of Schleswig-Holstein, to which province of Prussia it belongs; about 22 miles long, very narrow, but with a projecting peninsula on the east side; area, 40 sq. miles. It consists mainly of sand dunes, with some pasture for sheep. The inhabitants, about 3400 in number, are mostly Frisians by origin, and are largely engaged in fishing. The island is also a sea-bathing centre.

Sylvester I., Bishop of Rome, 314-335, was represented at the Council of Nice, and is said to have held a council at Rome to condemn the errors of Arius and others. The story of his having baptized Constantine and received Rome and its temporalities as a donation, is pure fiction. He is honoured as a saint.

Sylvester II., pope, was born of an obscure family in Auvergne, named Gerbert, and at an early age entered the monastery of St. Gerard, in Aurillac. He travelled into Spain to hear the Arabian doctors, and became so distinguished that he was appointed by Hugh Capet preceptor to his son Robert. Otho III., emperor, who had also been his pupil, conferred upon him the archbishopric of Ravenna in 998; and on the death of Gregory V., in 999, procured his election to the papacy. He maintained the power of the church with a high hand, was a great promoter of learning, and composed a number of works, particularly on arithmetic and geometry. He died in 1003. Among the vulgar he had the reputation of being a magician.

Sylvester, JOSHUA, English poet, born in 1563, was a member of the company of merchant adventurers at Stade, Holland. He is known chiefly as the translator into

English of the Divine Weeks and Works of the French poet Du Bartas. He died at Middelburg, Holland, in 1618.

Sylvia, a genus of insectorial birds of the dentiostrol tribe, type of the family Sylviadæ or warblers, of which *S. sylviola* (wood-warbler or wood-wren), *S. trochilus* (the willow-warbler), *S. hortensis* (the garden warbler), and *S. rubecula* or *Erythraea rubecula* (the redbreast), are common British examples.

Syl'viadæ. See above art.

Symbio'sis (Greek, *syn*, together, *bios*, life), a sort of parasitism consisting in the living together or in close relationship of two species of animals, or two species of plants, or of some plant and some animal, each being of service to the other in some respect, as regards food, protection, &c. A well-known case is that of the pea-crabs, which live within the shell of various living molluscs.

Symbol, a sign by which one knows or infers a thing; an *emblem*. It is generally a definite visible figure intended to represent or stand for something else, as in the case of the common *astronomical symbols*, which are signs conveniently representing astronomical objects, phases of the moon, &c., and astronomical terms. Some of these symbols are so ancient that we can find no satisfactory account of their origin. The symbols for the chief heavenly bodies are as follows:—Sun ☉, Mercury ☿, Venus ♀, Earth ♁ and ⊕, Moon ☾, Mars ♂, Ceres ♀, Pallas ♀, Juno ♀, Vesta ♂, Jupiter ♃, Saturn ♄, Uranus ♅, Neptune ♆, Comet ☄, Star ✨. The asteroids, except the four given above, are represented by a circle with a number, thus, (84).

Lunar Phases: ● Moon in conjunction, or *new*; ☾ Moon in eastern quadrature, or *first quarter*; ○ Moon in opposition, or *full*; ☾ Moon in western quadrature, or *last quarter*. See *Ecliptic*.—**Chemical symbols** are merely the first letters of the names of the chemical elements; or, when the names of two or more elements begin with the same letter, two letters are used as the symbol, one of which is always the first letter of the name of the element. Generally speaking the letters comprising the symbol are taken from the English name of the element; but in some instances, specially in the cases of metals which have been long known, the symbols are derived from the Latin names, as Fe (Lat. *ferrum*) for iron.

See *Chemistry*.—*Mathematical symbols* are letters and characters which represent quantities or magnitudes, and point out their relations; as, a' , a'' ; a^2 , a_3 ; a' , a ; the signs, +, -, ×, ÷, √, ∫, =, <, >, &c.

Symbolics, a theological term for the study of creeds and confessions of faith, &c., from the ancient meaning of the word *symbolon* (*symbolum*), a brief compendium, a creed.

Syme, JAMES, eminent surgeon, born at Edinburgh 1799; was educated at the High School and university of his native city, and studied anatomy under Barclay and Liston, visiting also Paris and Germany. In 1829 he opened Minto House Hospital, which he carried on for four years with great success as a surgical charity and school of clinical instruction; and in 1833 he was appointed professor of clinical surgery in Edinburgh University. In 1847, on Liston's death, he accepted the same professorship in University College, London; he soon, however, returned to his former chair in Edinburgh, and continued to hold it till his death in 1870. Among his numerous writings are a *Treatise on the Excision of Diseased Joints*, and *Principles of Surgery*.

Sym'machus, QUINTUS AURELIUS, a Roman writer, who flourished about 340-402 A.D., held important public offices under Theodosius the Great, and was a zealous champion of the pagan religion. We possess ten books of letters by him, which are of importance for the history of the time.

Symonds, JOHN ADDINGTON, English writer of prose and verse, born 1840, died 1893. He was educated at Harrow and at Balliol College, Oxford. His great work is the *Renaissance in Italy* (1875-86). Among his other works are: *Study of Dante*; *Studies of the Greek Poets*; *Sketches in Italy and Greece*; *Sketches and Studies in Italy*; translations of the *Sonnets of Michael Angelo* and *Campanella*; *Animi Figura*, a collection of sonnets; *Vagabunduli Libellus*; *Wine, Women, and Song*; *In Nights and Days*; *Essays*; *Life of Michael Angelo*.

Sympathetic Inks, inks which remain invisible until acted upon by heat or by some other reagent. See *Ink*.

Sympathetic Nervous System, the name applied to a set of nerves in vertebrate animals, forming a nervous system distinct from, and yet connected with, the chief nerve-centres, or *cerebro-spinal nervous system*. They are specially connected with the processes of organic life, the movements of the heart and of respiration, the work of the

stomach, &c., in digestion, the process of secretion in glands, &c. See *Nerve*.

Sympathetic Powder, in alchemy, a preparation which was reputed to have the property of curing a wound if applied to the weapon that inflicted it, or to a cloth dipped in the blood that flowed from it. It was said to be composed of calcined sulphate of iron.

Sym'pathy, in physiology, is that quality of the animal organization by which, through the increased or diminished activity of one organ, that of others is also increased or diminished. The idea of an organized system—the union of many parts in one whole, in which all these parts correspond to each other—includes the idea of a mutual operation, of which sympathy is a part. The sympathetic medium has been sometimes supposed to be the nervous system, sometimes the vascular or cellular system; but sympathy takes place between such organs as have no discoverable connection by nerves or vessels. The phenomenon of sympathy appears even in the healthy body; but its effect is much more often observed in diseases. *Sympathy* is further used to express the influence of the pathological state of one individual upon another, as in the contagion of hysteria or of yawning.

Sym'phony, an elaborate musical composition for a full orchestra, consisting usually, like the sonata, of three or four contrasted, yet inwardly related movements. Haydn, Mozart, Mendelssohn, and Beethoven are the most successful composers of this class of compositions.

Sym'phytum. See *Comfrey*.

Sympiesom'eter, a kind of barometer in which the weight of the air is indicated by the compression of gas in a tube, the lower part of the tube being filled with some oily fluid and the gas occupying the upper portion.

Symptoms, in medicine, the phenomena of diseases, from which we infer the existence and the nature of the disease. Symptoms have their seat in the functions which are affected by the disease, and may be perceptible by the patient alone (for example, pain and all change of sensations), or by the physician also (for example, all diseased movements). The nervous, the vascular, and the cutaneous systems are affected in most diseases, and thus afford symptoms. If the symptoms are perceptible only to the patient they are called *subjective*; if to the physician without necessary reference to the patient, they are *objective*.

Synagogue (from the Greek *synagōgē*, an assembly), the recognized place of public worship among the Jews. Its origin, it is supposed, belongs most probably to the date of the Babylonish captivity in the abeyance of temple worship. The synagogues were so constructed that the worshippers, as they entered and as they prayed, looked towards Jerusalem. At the extreme east end was the holy ark, containing copies of the Pentateuch; in front of this was the raised platform for the reader or preacher. The men sat on one side of the synagogue and the women on the other, a partition 5 or 6 feet high dividing them. The chief seats, after which the scribes and Pharisees strove, were situated near the east end. The constitution of the synagogue was congregational, not priestly, and the office-bearers were not hereditary, but were chosen by the congregation. A college of elders, presided over by one who was the ruler of the synagogue, managed the affairs of the synagogue, and possessed the power of excommunication. The officiating minister was the chief reader of the prayers, the law, the prophets, &c. The servant of the synagogue, who had the general charge of the building, generally acted on week-days as schoolmaster to the young of the congregation. The right of instruction was not strictly confined to the regularly-appointed teachers, but the ruler of the synagogue might call upon anyone present to address the people, or even a stranger might volunteer to speak. The modern synagogue differs little from the ancient. Instead of elders there is a committee of management; and the women are now provided with seats in a low latticed gallery. — The *Great Synagogue* was an assembly or council of 120 members said to have been founded and presided over by Ezra after the return from the captivity. Their duties are supposed to have been the remodelling of the religious life of the people, and the collecting and redacting of the sacred books of former times.

Synclinal. See *Anticlinal*.

Syncopation, in music, an alteration of the rhythm, by driving the accent to that part of a bar not usually accented.

Syncope (sin'ko-pē), the name given to that form of death characterized by failure and cessation of the heart's action as its primary feature. The term is also applied to the state of fainting produced by a diminution or interruption of the action of the heart, and of respiration, accompanied with

a suspension of the action of the brain and a temporary loss of sensation, volition, and other faculties. Fatal syncope is usually the result of some nervous 'shock,' resulting from some severe lesion of organs, or from a want of blood, or an altered and abnormal state of blood pressure. Ordinary syncope is caused chiefly by weakness, mental emotion, &c. The fainting patient should be laid on a couch and the head kept low; whilst great caution must be observed in stimulating the action of the heart.

Syndic, an officer intrusted with the affairs of a city or other community; also, a person appointed to act in some particular affair in which he has a common interest with his constituents, as when he is one among several creditors of the same debtor.

Syn'dicates, originally, councils or bodies of syndics; afterwards, associations of persons formed with the view of promoting some particular enterprise, discharging some trust, or the like; often, combinations of capitalists for the purpose of controlling production and raising prices. Formerly, combinations of capitalists simply aimed at an agreement as to how much each should produce, and what common price should be charged to the public, each producer still retaining control over his own business; but modern syndicates have absolute control over the operations of all the consenting parties, and aim at obtaining entire control of the industries with which they deal, so that both producer and consumer shall be at their mercy. Syndicates, in their modern form, originated in the United States, where they have been introduced into all the leading branches of trade, and are now in operation on a very extensive scale. From the United States they were transplanted to the continent of Europe, where they found a congenial soil, especially in Germany. Their introduction into Britain is of more recent date, but they promise to become as general there as elsewhere.

Synecdoche (si-nek'do-kē), in rhetoric, a figure in which the whole is put for a part, or a part for the whole, as the species for the genus, the genus for the species, &c.; as, a fleet of ten *sail*.

Syn'gnathus. See *Pipe-fishes*.

Synod, an ecclesiastical assembly convened to consult on church affairs. A synod may be diocesan, composed of a bishop and the clergy of his diocese; or provincial, of an archbishop and the bishops and clergy of his province; or national, of the whole clergy

of a state under a papal legate. The convocations of the English clergy are provincial synods. (See *Convocation*.) Synods in the Presbyterian Church are courts of review standing between the presbyteries and the General Assembly, and embracing a certain number of associated presbyteries, the clergy and elders of which constitute the respective synods. See *Assembly (General)* and *Presbyterians*.

Synodical Period, in astronomy, the period between two successive conjunctions or oppositions of two heavenly bodies. A synodical month is a lunation, being the period from one full moon to the next full moon, or from new moon to next new moon. It is 29 days, 12 hours, 44 minutes, 2·37 seconds.

Synonyms, or words having the same signification, strictly speaking, do not exist in any language; and in the popular use of the term synonyms are words sufficiently alike in general signification to be liable to be confounded, but yet so different in special definition as to require to be distinguished. The opposite of synonyms are *antonyms*.

Synoptic Gospels, a term applied to the gospels of St. Matthew, St. Mark, and St. Luke, which present a synopsis or general view of the same series of events. In St. John's gospel the events narrated are different. See *Gospel*.

Synovial Membrane, the membrane lining the various joints or articulations of the higher animals, and which secretes a peculiar fluid—the *synovial fluid*—for the due lubrication of the joint. The structure of the synovial membrane resembles that of the serous membranes (which see). Its secretion is a thick viscid fluid somewhat resembling white of egg. *Synovitis*, inflammation of the membrane, with increased secretion of fluid, is common. See *White-swelling*.

Syntax, that part of grammar which treats of the manner of connecting words into regular sentences, constructing sentences by the due arrangement of words or members in their mutual relations according to established usage. In every language there is some fundamental principle which pervades and regulates its whole construction, although it may occasionally admit of particular variations. In some languages the principle of juxtaposition prevails, and little diversity of arrangement is possible, as is the case in English, in which inflections are so few. The relations of the subject, the action, and the object are indicated by

their respective positions. In other languages—inflected languages like Latin or Greek—these relations are indicated by the changes in the forms of the words, and the modes of arrangement are various. Still, in the structure and disposition of sentences and parts of sentences the logical relations of the thoughts must regulate the construction, even where it appears to be most arbitrary.

Syn'thesis. See *Analysis*.

Syphilis, a disease usually communicated by impure sexual connection. It is a contagious and hereditary venereal disease, characterized in its primary or local stage by chancres or ulcers on the genitals, succeeded by inguinal buboes. The indications of a secondary or constitutional affection are ulcers in the throat, copper-coloured eruptions on the skin, pains in the bones, nerves, &c. The name of this disease is traced to a poem written in Latin hexameters by the Italian Fracastoro, and published in 1530. Its history is one of the most difficult parts of the history of medicine. It is impossible to say when or where the disease originated, but it appears to have occurred in Europe and certain parts of Asia from the earliest times, and has gradually spread over the whole globe. During the latter part of the 15th century it assumed an epidemic form, and spread throughout the whole of Europe. Like other diseases, it gradually diminished in virulence, particularly after Paracelsus had found in mercury a useful remedy against it.

Syphilization, the treatment of syphilis by means of repeated syphilitic inoculations. It was originated by M. Auzias of Turin in 1844, and warmly advocated by Professor Boeck of Christiania in 1851. Since his death, in 1875, syphilization as a method of treatment has fallen into disuse.

Syphon. See *Siphon*.

Syra (the ancient *Syros*), a Greek island in the *Ægean Sea*, in the middle of the Cyclades, 10 miles long and 5 broad. Anciently clothed with forests, and very fertile, it is now for the most part a brown and barren rock. Its inhabitants, only about 1000 at the beginning of the century, were largely recruited by refugees at the outbreak of the war of Greek independence, and latterly it has become the commercial centre of the Archipelago. Pop. 26,856.—**SYRA**, or **HERMOPOLIS**, the capital, is built round the harbour on the east side of the island. It is the seat of government for the Cyclades,

and one of the most important seaports of Greece. Pop. 18,760.

Syracuse (now *Siracusa*), anciently the chief city of Sicily, on the east coast of the island, one of the most magnificent cities in the world, with 500,000 inhabitants, is now greatly reduced, but still has an excellent harbour, capable of receiving vessels of the greatest burden. The ancient city was of a triangular form, 22 miles in circuit, and consisted of four parts surrounded by distinct walls; the modern city is confined to the small island of Ortygia, and is only about 2½ miles in circuit. It has some interesting remains and memorials of former times, with others on the mainland. The cathedral partly consists of an ancient Greek temple (perhaps of Minerva). The fountain of Arethusa now yields salt water. Syracuse was founded by a colony of Corinthians under Archias, B.C. 734, and, according to Thucydides, possessed a greater population than Athens or any other Grecian city. Among the most famous of its ancient Greek rulers were Gelon, Dionysius the elder and the younger, and Hiero I. and II. (see those articles). A besieging Athenian force was annihilated in B.C. 414; it fell into the hands of the Romans, after a three years' siege, in B.C. 212; and continued in their possession till the downfall of their empire. In 878 it was destroyed by the Saracens, and the mainland portion of the city has never since been rebuilt. Syracuse is the seat of an archbishop, and since 1865 has been the capital of a province of the same name. It has some manufactures of drugs, chemicals, earthenware, &c., and exports oranges and lemons, asphalt, &c. Pop. 32,000.

Syracuse, a city of the United States, cap. of Onondaga county, New York, 148 miles west of Albany, on Onondaga Lake (saline), on the Erie Canal and two railways. It has spacious and well-built streets, handsome churches, splendid hotels, university, and complete system of public schools, &c. The salt industry, to which it owed its early prosperity, is still productive, soda-ash and other chemicals being also made; and other industries include machinery, rolling-mills, furnaces, steel-works, &c., while there is an extensive traffic by rail and canal. Pop. 108,374.

Syr-Daria. See *Sir-Daria*.

Syria, a country forming part of Asiatic Turkey, and bounded on the north by the Taurus range, on the north-east by the Eu-

phrates, on the east by the Syrian desert, on the south and south-east by Arabia, on the south-west by Egypt, and on the west by the Mediterranean; area, estimated at about 115,000 square miles. The coast has some low sandy tracts, but is in general, though not deeply indented, lofty and precipitous, rising, particularly in Mount Carmel, to the height of 3000 feet. The only good harbours are those of Beyrout and Alexandretta (Scanderoon). In Lebanon the mountains reach a height of about 10,000 feet. Between the two parallel ranges of Libanus and Anti-Libanus is the valley of Cœle-Syria, whence the Orontes flows northwards, turning westwards at Antioch, and falling into the sea at the ancient Seleucia. The principal river of South Syria (Palestine, which see) is the Jordan. In the course of the Jordan are the lakes of Merom and Tiberias, and at its mouth is the far larger lake, the Dead Sea. Much of the soil, more especially in the valleys of Lebanon, is very fertile; but agriculture is not pursued with so much zeal as in ancient times. Nevertheless, the orchards of Damascus and the corn-fields of Hauran are celebrated, and the olive-tree and the vine are found in all parts. The country is poor in minerals; the native manufactures in silk, cotton, and wool have been paralysed by the import trade from Europe; and the caravan trade has almost entirely ceased. The inhabitants, roughly estimated at about 2,500,000, consist chiefly of two elements, the Aramaic and the Arabic, the latter including Bedouins and town and peasant Arabs. Jews are found only in the large towns, and have immigrated back from Europe. The language generally spoken is Arabic, but with Aramaic elements. The Mohammedans comprise about four-fifths of the population, and the Christians one-fifth. Syria at an early period became part of the Assyrian Empire, and afterwards passed to the Persians, the Greeks, and the Romans. It formed part of the Byzantine Empire, but was taken by the Arabs in 636, by the Seljuk Turks in 1078, by the Crusaders, whose kingdom of Jerusalem lasted till 1293, by the Mamelukes, who united it with Egypt, and by the Ottoman Turks, who added it to their empire in 1517. The most important events in the modern history of Syria are its conquest by Mehemet Ali of Egypt in 1833, and its restoration to Turkey in 1840 by the intervention of the great European powers; and the war

between the Druses and Maronites which broke out in 1860, peace being restored in 1861 only by the active efforts of a French force sent out under sanction of Turkey and the western powers. At present Syria comprises three vilayets—Syria proper, Aleppo, and Beyrout, and the mutessarifates of Zor (on the Euphrates), Lebanon, and Jerusalem. Lebanon has the special privilege of being under the rule of a Christian Mutessarif.

Syriac, a dialect or branch of the Aramaic, and thus one of the Semitic family of languages. (See *Aramean*.) It was a vernacular dialect in Syria during the early centuries of our era, but ceased to be spoken as a living language about the 10th century, being crowded out by that of the Arabian conquerors. A very corrupted form of it, however, is still spoken by a few scattered tribes, and principally by the Nestorians of Kurdistan and Persia. Syriac literature had its rise in the 1st century of our era. At first it was chiefly connected with theological and ecclesiastical subjects, Biblical translations and commentaries, hymns, martyrologies, liturgies, &c., but in course of time it embraced history, philosophy, grammar, medicine, and the natural sciences. The oldest work in the language still extant is the incomplete translation of the Bible called the Peshito. (See *Peshito*.) In addition to the Peshito Version, which was recognized as the authorized version by all the various sects of the Syrian Church, there is one made in the beginning of the 7th century by Paul of Tela, a Monophysite; this is based on the Hexaplar Greek Text, that is, the Septuagint with the corrections of Origen, and is of very great value for the criticism of the Septuagint. Another version, the Syro-Philoxenian, due to Philoxenus, bishop of Hierapolis (488-518), is partly in existence. Among the MSS. brought by him from Syria in 1842 Dr. Cureton discovered an imperfect copy of the Gospels, differing widely from the common text, and supposed by him to belong to the 5th century. An older and more complete version was discovered on Mt. Sinai in 1892. Some manuscripts contain books not in our New Testament. The most learned representative of the old orthodox Syrian Church is undoubtedly Ephraem Syrus, who flourished in the 4th century. The Syriac literature, like the language, was superseded by that of the Arabians. The latest Syriac classic writer is Bar-Hebraeus, bishop of Maraga, who died in 1286. The greater

part of this literature has been lost, but much valuable material still remains unedited.

Syrian Christians, or **CHURCH OF THE SYRIAN RITE**, that section of the Christian church which had its stronghold in Syria, and which was originally included in the Patriarchate of Antioch, and subsequently in that of Jerusalem. Up to the end of the 4th century the Syrian Church was in a very flourishing condition, having at that time a membership of several millions; but controversies arising on the incarnation, it split up into several sects, such as the Maronites in Lebanon, the Jacobites in Mesopotamia, the Christians of St. Thomas in India, and the Nestorians in Kurdistan. The term Syrian Christians is frequently specially applied to the latter community.

Syringa. See *Lilac*.

Syringe, an instrument consisting of a cylinder of metal or glass fitted with an air-tight piston, which is moved up and down by means of a handle. In its simplest form it is destitute of valves, one simple aperture at the extremity serving for the admission and ejection of fluid; those provided with valves, however, are available, on a small scale, for all the purposes of an air-pump.

Syrrhaptēs. See *Sand-grouse*.

Syrtes (sér'tēz), two large gulfs of the Mediterranean on the coast of Africa. The Lesser Syrtis, or Gulf of Cabes, lies on the east coast of Tunis; the Greater Syrtis, or Gulf of Sidra, lies between Tripoli and Barka. The navigation of the Syrtes was anciently considered very dangerous.

Syrup, in medicine, a saturated, or almost saturated solution of sugar in water, either simple, flavoured, or medicated. In the sugar manufacture, a syrup is a strong saccharine solution which contains sugar in a condition capable of being crystallized out, the ultimate uncrystallizable fluid being called treacle or molasses.

Syzran, or **SYSRAN**, a town of Central Russia, in the government of Simbirsk, and 90 miles south of the city of that name, a few miles from the Volga. It has tanneries, flour-mills, &c., and large exports of grain. Pop. 33,000.

Syzygy (sí'zi-jí), in astronomy, the conjunction or opposition of any two of the heavenly bodies. See *Moon*.

Szabadka (sá-bád'ká). See *Theresiopel*.

Szarvas (sár'vásh), a town of Hungary, county of Bekes, on the Körös. Pop. 27,553.

Szatmar (sát'mär), a royal free town of Hungary, in a marshy plain on the Szamos,

69 miles E.N.E. of Grosswardein. It has a considerable trade in wine and wood, is the seat of a Roman Catholic bishop, and contains a cathedral. Pop. 26,266.

Sze-chuen, a large province in the west of China; area, 166,800 square miles. The surface is generally rugged and full of defiles, especially in the west, where many peaks rise far above the snow-line, but there is a plain of some extent surrounding Ching-too-fo, the capital. The principal river is the Yang-tse-kiang. The soil is only moderately fertile, but there is some metallic wealth. Pop. 67,712,897.

Szegedin (seg'e-din), a royal free city of Hungary, capital of the county of Csongrad, at the confluence of the Maros and Theiss, 60 miles west of Arad. It is second only to Budapest, and is a great centre of commerce and agriculture. It has numerous industrial establishments, large salt and tobacco magazines, and a considerable shipping trade, especially in coal and timber. The town was almost completely destroyed by an inunda-

tion in March 1879, but great embankments have since been built for its protection, and the whole town reconstructed, some fine public buildings having been erected. Pop. 103,000.

Szegszard (seg'särd), a market-town of Hungary, 81 miles south-west of Budapest, on the Sarviz. Pop. 13,895.

Szekler (sek'lér), a Hungarian people inhabiting Transylvania, and preserving the Magyar characteristics in their purest form.

Szentes (sen'tesh), a town of Hungary, in the county of Csongrad, 29 miles N.N.E. of Szegedin. The inhabitants are chiefly engaged in agriculture and fishing. Pop. 31,308.

Szigeth (si'get), or **SZIGETVAR**, a town of South-western Hungary, formerly an important fortress. Pop. 5600.

Szolnok (sol'nok), a market-town of Hungary, on the Theiss and the Zagyva, is the junction of four railways, and has a considerable trade in tobacco, salt, and wood. Pop. 25,380.

T.

T, the twentieth letter in the English alphabet, a sharp mute consonant, representing the sound produced by a quick and strong emission of the breath after the end of the tongue has been placed against the roof of the mouth near the roots of the upper teeth. By Grimm's law *t* in English corresponds to *d* in Latin, Greek, and Sanskrit, and to *ss* or *z* in German.

Taasinge (tā'sing-é), an island of Denmark, south of Funen; area, 29 square miles. Pop. 4340.

Tabā'nus. See *Gad-fly*.

Tab'ard, a sort of tunic of the middle ages, worn over the armour, and generally embroidered with the arms of the wearer, or if worn by a herald, with those of his lord or sovereign. It still forms a part of the official dress of heralds.

Tabas'co, a state of Mexico, between Yucatan Peninsula and Vera Cruz; area, 12,716 square miles. The surface consists almost entirely of a great flat, sloping northwards to the Gulf of Mexico. A large portion of the state is still covered with primeval forests. The inhabitants are chiefly Indians. The capital is San-Juan-Bautista. Pop. of the state, 158,107.

Tab'asheer, or **TABASHIR** (Persian), a sili-

ceous concretion resembling hydrophane, sometimes found in the joints of bamboos and other large grasses. It is highly valued



Tabard, Sir John Cornwall, Amptill Church, Beds.

in the East Indies as a medicine, but its virtues are merely imaginary.

Tabby, the name given to stuffs watered or figured by being passed through a calender, the rollers of which, bearing unequally on the stuff, render the surface unequal, so

as to reflect the rays of light differently, and produce the representation of waves. Silks treated in this way are called *noiré*.

Tabernacle, in Jewish antiquities, the tent or sanctuary in which the sacred utensils were kept during the wanderings of the Israelites in the desert. It was in the shape of a parallelogram, 45 feet by 15, and 15 feet in height, with its smaller ends placed east and west, and having its entrance in the east. Its framework consisted of forty-eight gilded boards of shittim-wood, bound together by golden rings and set into silver sockets; and this framework was covered with four carpets. The interior was divided by a curtain into two compartments, the outer the 'sanctuary' proper, and the innermost the holy of holies. In the sanctuary was placed on the north the table of show-bread, on the south the golden candlestick, and in the middle, near the inner curtain, the altar of incense. In the centre of the holy of holies stood the ark of the covenant. The tabernacle was situated in a court 150 feet by 75, surrounded by costly screens $7\frac{1}{2}$ feet high, and supported by pillars of brass $7\frac{1}{2}$ feet apart, to which the curtains were attached by hooks and fillets of silver. In the outer or eastern half of the court stood the altar of burnt-offering, and between it and the tabernacle itself the laver for the ablutions of the priests. Modern critics do not admit that the Jews could have possessed such a structure in their wanderings.

Tabernacle, in ecclesiology, an ornamented receptacle in which the host is kept on the altar; also a reliquary.

Tabernacles, FEAST OF, the last of the three great festivals of the Jews which required the presence of all the males in Jerusalem. Its object was to commemorate the dwelling of the Israelites in tents during their sojourn in the wilderness, and it was also a feast of thanksgiving for the harvest and vintage. The time of the festival fell in the autumn, when all the chief fruits were gathered in, and hence it is often called the feast of the ingathering. Its duration was strictly only seven days, but it was followed by a day of holy convocation of peculiar solemnity. During the seven days the people lived in booths erected in the courts of houses, on the roofs, and in the court of the temple. It was the most joyous festival of the year.

Tabes (tā'bēz), a term formerly applied to a disease characterized by a gradually

progressive emaciation of the whole body, accompanied with languor, depressed spirits, and, for the most part, imperfect or obscure hectic fever, without the real cause of the affection being properly localized or defined. — *Tabes mesenterica*, abdominal phthisis, or consumption of the bowels, is a disease of the bowels caused by the formation of tubercles similar to those of the lungs in ordinary consumption. It causes extreme wasting, feebleness, and thinness of body, and recovery is rare. — *Tabes dorsalis* is the same as *locomotor ataxy* (which see).

Tab'inēt, a rich fabric consisting of a warp of silk and a weft of wool, employed for window curtains and other furniture purposes.

Table, ROUND. See *Round Table*.

Tableaux Vivants (tāb-lō vā-vān; French = 'living pictures'), representations of scenes from history or fiction by means of persons grouped in the proper manner, placed in appropriate postures, and remaining silent.

Table-land, or **PLATEAU**, a flat or comparatively level tract of land considerably elevated above the general surface of a country. Being in effect broad mountain masses, many of these plateaux form the gathering-grounds and sources of some of the noblest rivers, while their elevation confers on them a climate and a vegetable and animal life distinct from that of the surrounding lowlands. In Europe the chief table-lands are that of Central Spain, the less-defined upland in Switzerland, and the lower plateaux of Bavaria and Bohemia. In Asia are the most extensive table-lands in the world: the sandy rainless Desert of Gobi, nearly 400,000 square miles; and the loftiest inhabited table-land in the world, that of Tibet, with an elevation of from 11,000 to 15,000 feet. In Africa are the plateaux of Abyssinia, and the karoo or terrace plains of South Africa. In America the great table-lands are those of Mexico and the Andes.

Table Money, an allowance granted to general officers in the army and flag-officers in the navy in certain localities to enable them to meet the duties of hospitality.

Table Mountain, a mountain of South Africa, south of Table Bay, its highest point being right over Cape Town. It is about 3580 feet high and level on the top. It joins the Devil's Mount on the east, and the Sugar Loaf or Lion's Head on the west.

Tables, THE, in Scottish ecclesiastical history, the permanent council held in Edin-

burgh for managing the affairs of the Covenanters during the reign of Charles I., said to have been so named from a green table at which the members sat.

Table-turning, one of the phenomena of spiritualism, generally attributed to unconscious muscular action. It originated in America, and prevailed all over Europe in 1853.

Taboo', or **TABU**, a peculiar institution formerly prevalent among the South Sea islanders, and used in both a good and bad sense—as something sacred or consecrated, and as something accursed or unholy—both senses forbidding the touching or use of the thing *taboo*. The idea of prohibition was always prominent. The whole religious, political, and social system of the primitive Polynesians was enforced by the taboo, the infringement of which in serious cases was death. A similar institution exists elsewhere.

Tabor, a small drum, formerly used as an accompaniment to a pipe or fife.

Tabor, a remarkable hill of Northern Palestine, rising abruptly in the shape of an almost perfect cone from the plain of Esdraëlon to a total height of 2018 feet. It is clothed with woods to the very summit, where a view of immense extent is obtained. Its isolation led the earlier ecclesiastics to make it the scene of the transfiguration; but the historical data which we possess show that its summit was employed without intermission from 218 B.C. till 70 A.D. as a stronghold.

Tabor, a town of Bohemia, on an eminence above the Luschnitz, 48 miles S.S.W. of Prague, with old walls and towers. Its castle was a stronghold of the sect of Hussites called Taborites, and makes a conspicuous figure in their history. Pop. 10,692.

Taborites. See *Hussites*.

Tabreez', or **TABRIZ'** (the ancient *Tauris*), a city of Persia, capital of the province of Azerbaijan, on the Aigi, 36 miles above its entrance into Lake Urumia. It lies at the inner extremity of an amphitheatre, about 4000 feet above sea-level, with hills on three sides, and an extensive plain on the fourth. It is surrounded with a wall of sun-dried brick, with bastions, and entered by seven or eight gates. There are numerous mosques, bazaars, baths, and caravanserais. The citadel, originally a mosque, and 600 years old, was converted by Abbas Mirza into an arsenal. The blue mosque dates from the 15th century. Tabreez has manufactures of

silks, cottons, carpets, leather and leather goods, &c. It is the great emporium for the trade of Persia on the west, and has an extensive commerce. It has frequently suffered from earthquakes. Pop. 170,000.

Tabular-spar, or **TABLE-SPAR** (called also *Wollastonite*), in mineralogy, a silicate of lime, generally of a grayish-white colour. It occurs either massive or crystallized, in rectangular four-sided tables, and usually in granite or granular limestone, occasionally in basalt or lava.

Tacahout (tak'a-hyt), the small gall formed on the tamarisk-tree (*Tamarix indica*). It is imported into Britain for the sake of its gallic acid, and is used as a mordant in dyeing and in tanning.

Tacamahac', the name given to a bitter balsamic resin, the produce of several kinds of trees belonging to Mexico and the West Indies, the East Indies, South America, and North America. The balsam-poplar or *tacamahac* is one of these. See also *Calophyllum*.

Tachygraphy (ta-kig'ra-fi). See *Short-hand*.

Tachypetes (ta-kip'e-tēz). See *Frigate-bird*.

Tacitus, **CAIUS CORNELIUS**, a Roman historian, born probably about 54 A.D. Of his education and early life we know little. He seems to have been first appointed to public office in the reign of Vespasian. Under Titus, by whom he was treated with distinguished favour, he became quaestor or ædile; was prætor under Domitian (A.D. 88), and consul under Nerva (A.D. 97). In 78 he married the daughter of Cneius Julius Agricola, the celebrated statesman and general, whose life he afterwards wrote. He was several years absent from Rome on provincial business, and probably then made the acquaintance of the German peoples. After his return to Rome he lived in the closest intimacy with the younger Pliny, and had a very extensive practice in the profession of law, acquiring a high reputation as an orator. The time of his death is uncertain; but it probably took place after A.D. 117. We have four historical works from his pen: his *Annals*, in sixteen books (of which books seventh to tenth inclusive are lost), which contain an account of the principal events in Roman history from the death of Augustus (A.D. 14) to that of Nero (A.D. 68); his *History* (of which only four books and a part of the fifth are extant), which begins with the year 69 A.D., when

Galba wore the purple, and ends with the accession of Vespasian (70); his Germany, an account of the geography, manners, &c., of the country; and his Life of Agricola. The works of Tacitus have been pronounced, by the unanimous voice of his contemporaries and of posterity, to be masterpieces in their way. His style is exceedingly concise, so much so as to make it often difficult to gather his full meaning without great care. He had a wonderful insight into character, and could paint it with a master's hand. A high moral tone pervades all his writings.

Tack, in navigation, the course of a ship in regard to the position of her sails and the angle at which the wind strikes them. Tacking is an operation by which a ship is enabled to beat up against a wind by a series of zigzags, the sails being turned obliquely to the wind first on one side and then on the other.

Tackamahack. See *Tacamahac*.

Tacna, a town (and prov.), N. Chili, in a plain on a river of same name, connected by rail with Arica. Pop. 8000.

Tacoma, a town of the United States, in the state of Washington, on Puget Sound, terminus of the Northern Pacific Railroad, a rising place with two universities, various industries, extensive docks, and trade in grain, lumber, coal, &c. Pop. 37,714.

Taconic Mountains, a range of mountains in the United States, connecting the Green Mountains of Western Massachusetts with the highlands of the Hudson. The 'Taconic System,' in geology, was named from the characteristic strata of this range, a metamorphic rock, believed to be older than the Silurian system.

Tactics, the branch of military science which relates to the conduct of troops in battle. *Strategy*, on the other hand, refers to the movements leading up to a battle.

Tacunga, a town of Ecuador, capital of the prov. Leon, at the foot of Cotopaxi. Pop. 17,000.

Tad'ema. See *Alma-Tadema*.

Tadmor. See *Palmmyra*.

Tadpole, the name given to the larval or young state of frogs and other amphibians.

Tael, a money of account in China worth about 3s., but the value of which varies considerably according to locality and the rate of exchange. It stands for a weight equal to about an ounce of silver.

Tænia. See *Tape-worm*.

Tæpings. See *China*.

Taff'eta, or **TAFFETY**, was originally the name applied to all kinds of plain silks, but which has now become a kind of generic name for plain silk, gros de Naples, gros des Indes, shot silk, glacé, and others. The term has also been applied to mixed fabrics of silk and wool.

Taffrail, or **TAFFEREL**, a curved wooden rail running from one quarter-stanchion to the other of a ship's stern, and usually ornamented with some device in sculpture.

Tafia, or **TAFFIA**, in the French West India Islands, an inferior variety of rum distilled from molasses.

Taflelt, or **TAFILET**, a large oasis in the Sahara of Morocco; area, 500 square miles; pop. 100,000. The chief place is Abuum.

Taganrog, a seaport of Russia, in the government of Ekaterinoslav, on a low cape on the northern shore of the Sea of Azof. It is built chiefly of wood, but the imperial palace and the Greek monastery are worthy of notice. The harbour, though the deepest in the Sea of Azof, is shallow, not admitting vessels which draw more than 8 or 9 feet; but its situation secures to it a considerable trade, which, however, depending on the crops in South Russia, is subject to great fluctuations. The chief article of export is corn. Pop. 56,047.

Taglioni (tál-yō'ni), MARIE, ballet dancer, born 1809, was trained by her father, an Italian master of the ballet; appeared at Vienna in 1822, at Paris in 1827, and at London, where she created a great sensation, in 1838. She visited all the capitals of Europe, and was acknowledged the first ballet dancer of her time. She retired from the stage in 1847; but subsequently, losing her savings in speculation, she supported herself in London as a teacher of deportment. She died at Marseilles in 1884.

Tagus (Spanish, *Tajo*; Portuguese, *Tejo*), the largest river of Spain and Portugal, issues from the mountains of Albaracin, on the frontier of New Castile and Aragon, flows north-west and south-west, passing by Aranjuez, Toledo, Talavera, and Alcantara, enters Portugal, passing by Abrantes, Santarem, and Lisbon, 10 miles below which it enters the Atlantic. It has a total length of 540 miles, and is navigable for 115 miles.

Tahiti (tá-hē'ti), the largest of the Society Islands, consisting of two peninsulas, connected by an isthmus 3 miles broad, and submerged at high-water; area, 412 square miles. It is hilly, volcanic, beautiful, and highly fertile; and produces sugar, cocoa-nut,

arrow-root, dye-woods, &c. The chief town is Papeete, which has an excellent harbour.



Tahitians.

Pop. of island, 10,500. See *Society Islands*.

Taichu, or **TAIWAN**, an important city of Formosa, in the west, on the railway running north and south. Pop. 50,000.

Taiho'ku, formerly **TAIPEH**, capital of the Japanese island of Formosa, near the north coast, not far from Tamsui and Kelung. Pop. (incl. adjacent places), 78,000.

Tail. For estates in tail, or entailed estates, see *Entail*.

Tailor-bird (*Orthotomus longicaudus*), a bird of the warbler family, so named from its habit of sewing together leaves to form a nest; a native of India and the Eastern Archipelago.

Taimyr (ti'mēr), a peninsula of Northern Siberia, containing Cape Chelyuskin, the most northerly land in Asia.

Tain, a royal and parl. burgh of Scotland, in the county of Ross and Cromarty, on the Dornoch Firth, one of the Wick district of burghs. Pop. 2076.

Tainan, a town near the south-west coast of Formosa, carrying on an extensive trade through the ports of Anping and Takow.

Taine (tân), **HIPPOLYTE ADOLPHE**, French writer, born at Vouziers (Ardennes) in 1828, was educated at the Collège Bourbon

and the École Normale. In 1854 his first work, an Essay on *Lyry*, was crowned by the Academy; in 1864 he was appointed professor in the School of Fine Arts in Paris; and in 1878 he was elected to a seat in the Academy. His voluminous writings include *History of English Literature*, one of the best and most philosophical works on the subject (1864, four vols.); various works on literature, philosophy, and art; and *Origins of Contemporary France* (1875-94), a work of great research and value, in three sections, dealing respectively with the Ancient Régime, the Revolution, and the Modern Régime. He died in 1893.

Taipeh. See *Taihoku* (above).

Taipings, or **TAEPINGS**. See *China*.

Tait, **ARCHIBALD CAMPBELL**, archbishop of Canterbury, son of Crauford Tait, writer to the signet, was born at Edinburgh in 1811, died 1882. He was of Presbyterian descent, and was educated at Edinburgh, Glasgow, and Balliol College, Oxford, where he became fellow and tutor. As one of the 'Four Tutors', he publicly opposed Newman in the Tractarian controversy. He was appointed headmaster of Rugby on the death of Dr. Arnold in 1842; dean of Carlisle in 1850; bishop of London in 1856; and archbishop of Canterbury, in succession to Dr. Longley, in 1868. His primacy was marked by the disestablishment of the Irish Church, and by the Public Worship Regulation Act of 1874.

Tait, **PETER GUTHRIE**, physicist and mathematician, born at Dalkeith 1831, was educated at Edinburgh and Peterhouse, Cambridge, where he was senior wrangler and first Smith's prizeman, and subsequently fellow of his college. In 1854 he was appointed professor of mathematics at Queen's College, Belfast, and in 1860 professor of natural philosophy at Edinburgh. He died in 1901. He was the joint author, with Lord Kelvin, of a well-known text-book on *Natural Philosophy*, and with Professor Balfour Stewart of *The Unseen Universe*. His *Heat* appeared in 1884, *Light* in 1884, and *Properties of Matter* in 1885. The Royal Society, London, awarded him a royal medal in 1886.

Taiwan (ti-wán'), a name of the Japanese island Formosa, and also of the city Taichu (see above). See *Formosa*.

Taj-Mahal'. See *Agra*.

Taju'rah, a small seaport on the African coast of the Gulf of Aden, on a bay of same name, in French Somaliland.

TAKOW—TALIPOT PALM.

Takow, an open port in the south-west of Formosa, south of Tainan (which see). Pop. 8000.

Talavera de la Reina (rā'i-nā), a town of Spain, province of Toledo, on the Tagus, 64 miles south-east of Madrid; a picturesque place, with various interesting buildings. In a great battle fought here, July 27 and 28, 1809, Wellington defeated the French under Victor, Jourdan, and King Joseph. Pop. 10,500.

Talbot, a kind of hound formerly in vogue, pure white in colour, probably the original of the blood-hound.

Talbotype. See *Photography*.

Talc, a hydrated magnesian silicate of crystalline texture, translucent, and often transparent when in very thin plates. A variety of talc called French chalk (or steatite) is used for tracing lines on wood, cloth, &c., instead of chalk. See *Potstone*, *Soapstone*, *Steatite*. The name talc is often erroneously given to varieties of mica; this mineral is also a complex magnesian silicate, and forms black masses, which readily split into thin, translucent, flat laminae or plates with a high lustre, and is used in many parts of India and China as a substitute for window-glass. It is a constituent of granite.

Talca, a town of Chili, capital of the province of Talca, on the Claro, is connected by rail with Santiago, and has manufactures of ponchos. Pop. 42,625. The province has an area of 3664 sq. miles, and pop. 128,961.

Talcahuana, a seaport of Chili, province Concepcion, with an arsenal, shipyards, &c. Pop. 2500.

Talent, the name of a weight and denomination of money among the ancient Greeks, and also applied by Greek writers to various standard weights and denominations of money of different nations; the weight and value differing in the various nations and at various times. The Attic talent as a weight contained 60 Attic minæ or 6000 Attic drachmæ, equal to 56 lbs. 11 oz. British troy weight. As a denomination of silver money it was equal to £243, 15s. The great talent of the Romans is computed to be equal to £99, 6s. 8d. and the little talent to £75 sterling. A Hebrew weight and denomination of money, equivalent to 3000 shekels, also receives this name. As a weight it was equal to about 93½ lbs. avoird.; as a denomination of silver it has been variously estimated at from £340 to £396.

Talfourd (tāl'furd), SIR THOMAS NOON, English dramatist and poet, was born in

1795, and was brought up at Reading, where his father was a brewer. He was called to the bar in 1821, and in 1833 was made serjeant-at-law. In 1835 he was returned to parliament for Reading, and in 1836 his tragedy of *Ion* (published the previous year) was produced at Covent Garden, and achieved distinguished success. The tragedies subsequently produced by him were *The Athenian Captive*; *Glencoe*, or *the Fate of the Macdonalds*; and *The Castilian*, an historical tragedy. Besides his dramas he was the author of a *Life of Charles Lamb* and of *Vacation Rambles*. In 1849 he was raised to the bench in the Court of Common Pleas, and received at the same time the honour of knighthood. He died suddenly in 1854 at Stafford, while delivering his charge to a grand-jury.

Taliacotian Operation. See *Rhinoplastic Operation*.

Taliessin, a Welsh bard said to have flourished during the 12th or 13th century, and styled *Pen Beirdd*, 'the chief of the bards.'

Talipot Palm (*Corypha umbraculifera*), the great fan-palm, a native of Ceylon. The cylindrical trunk reaches a height of 60, 70,



Talipot Palm (*Corypha umbraculifera*).

or 100 feet, and is covered with a tuft of fan-like leaves, usually about 18 feet in length and 14 in breadth. The leaves are used for covering houses, for making umbrellas and fans, and as a substitute for paper. When the tree has attained its full growth, the flower spike bursts from its envelope or

spathe with a loud report. The flower spike is then as white as ivory, and occasionally 30 feet long. When its fruit is matured, the tree generally dies.

Talisman, a figure cast or cut in metal or stone, and made, with certain superstitious ceremonies, at some particular moment of time, as when a certain star is at its culminating point, or when certain planets are in conjunction. The talisman thus prepared is supposed to exercise extraordinary influences over the bearer, particularly in averting disease. In a more extensive sense the word is used, like amulet, to denote any object of nature or art, the presence of which checks the power of spirits or demons, and defends the wearer from their malice. Relics, consecrated candles, rosaries, images of saints, &c., were employed as talismans in the middle ages; and at that time the knowledge of the virtues of talismans and amulets formed an important part of medical science.

Talitrus. See *Sandhopper*.

Tallage, a sort of tax formerly levied by the English kings on towns and counties, as part of the revenues of the crown, being originally exacted probably in lieu of military service. It was abolished by statute of 1340.

Tallahassee, a city of the United States, capital of the state of Florida, 194 miles east of Mobile. It is connected by rail with the seaport of St. Marks, about 26 miles distant. It is well laid out; has a state capitol, court-house, &c. Pop. 2934.

Tallard (tāl-lār), CAMILLE DE LA BAUME, DUC DE HOSTUN, COMTE DE, Marshal of France, descended of an ancient family of Dauphiny, was born in 1652, died 1728. He entered the army young, and after serving under the Great Condé in Holland was engaged under Turenne in Alsace in the brilliant campaigns of 1674 and 1675. He distinguished himself subsequently on various occasions, and in 1693 was made lieutenant-general; marshal in 1703. In 1704 he was taken prisoner at the battle of Blenheim, and was carried to England, where he remained seven years.

Tallegalla, or BRUSH TURKEY, a remarkable genus of rasorial birds, belonging to the family of Megapodidae, or mound-birds. (See *Megapodius*.) The *Tallegalla Lathāmi* is the best-known species, and that usually designated by the distinctive name of 'brush turkey.' It inhabits Australia, where it is also known by the names 'wattled tallegalla' and 'New Holland vulture'—this

latter name having reference to the naked vulturine head and neck. The male when full grown is coloured of a blackish-brown above and below, with grayish tints on the back. The head and neck are covered with very small feathers of blackish hue, whilst a large wattle, coloured bright or orange yellow, depends from the front of the neck. These birds are remarkable on account of the huge, conical 'egg-mound' which they form, several of them jointly, for the purpose of therein depositing their eggs, which are hatched by the heat of the decomposing mass of vegetable matter piled up. The eggs are greatly sought after on account of their delicious flavour.

Talleyrand-Périgord (tāl-ā-ràn-pā-rē-gör), CHARLES MAURICE DE, Prince of Benevento, French diplomatist, was born at Paris in 1754, died there in 1838. Though the eldest of three brothers he was, in consequence of lameness caused by an accident, deprived of his rights of primogeniture, and devoted, against his will, to the priesthood. His high birth and great ability procured him rapid advancement, and in 1788 he was consecrated bishop of Autun. On the meeting of the states-general he was elected deputy for Autun. He sided with the popular leaders in the revolutionary movements; and his advocacy of the abolition of tithes and the transference of church lands to the state gained him great popularity. In 1790 he was elected president of the national assembly. When the civil constitution of the clergy was adopted he gave his adhesion to it, and ordained the first clergy on the new footing. For this he was excommunicated by a papal brief, and thereupon embraced the opportunity to renounce his episcopal functions (1791). In 1792 he was sent to London charged with diplomatic functions, and during his stay there was proscribed for alleged royalist intrigues. Forced to leave England by the provisions of the Alien Act, in 1794 he sailed for the United States, but returned to France in 1796. The following year he was appointed minister of foreign affairs; but being suspected of keeping up an understanding with the agents of Louis XVIII. he was obliged to resign in July 1799. He now devoted himself entirely to Bonaparte, whom he had early recognized as the master spirit of the time, and after Bonaparte's return from Egypt contributed greatly to the events of the 18th Brumaire (10th November, 1799), when the directory fell and

the consulate began. He was then reappointed minister of foreign affairs, and for the next few years was the executant of all Bonaparte's diplomatic schemes. After the establishment of the empire in 1804 he was appointed to the office of grand-chamberlain, and in 1806 was created Prince of Benevento. After the Peace of Tilsit in 1807 a



Talleyrand.

coolness took place between him and Napoleon, and became more and more marked. In 1808 he secretly joined a royalist committee. In 1814 he procured Napoleon's abdication, and afterwards exerted himself very effectually in re-establishing Louis XVIII. on the throne of his ancestors. He took part in the Congress of Vienna, and in 1815, when the allies again entered Paris, he became president of the council with the portfolio of foreign affairs; but as he objected to sign the second Peace of Paris he gave in his resignation. After this he retired into private life, in which he remained for fifteen years. When the revolution of July 1830 broke out, he advised Louis Philippe to place himself at its head and to accept the throne. Declining the office of minister of foreign affairs he proceeded to London as ambassador, and crowned his career by the formation of the Quadruple Alliance. He resigned in November 1834, and quitted public life for ever. His *Memoirs* (1891) are of little value.

Tallien (tál-i-an), JEAN LAMBERT, French revolutionist, was born at Paris in 1769, and first made himself known by publishing a revolutionary journal called *Ami du Citoyen*.

He soon became one of the most popular men of the revolutionary party, and took part in most of the sanguinary proceedings which occurred during the ascendancy of Robespierre. After the fall of Danton and his party he perceived that he should become one of the next victims of Robespierre if he did not strike the first blow, and it was mainly by his influence that the latter with his friends was brought to the guillotine. He subsequently became a member of the Council of Five Hundred, but his influence gradually declined. In after years he was glad to accept the office of French consul at Alicante. He died at Paris, in poverty and obscurity, in 1820.

Tallis, THOMAS, author of some of the finest music in the cathedral service of the English Church, was born about 1515, and served in the chapel royal during the reigns of Henry VIII., Edward VI., Mary, and Elizabeth. He died in 1585, and was buried in the parish church at Greenwich.

Tallow, the harder and less fusible fat of animals, especially cattle and sheep, melted and separated from the fibrous matter mixed with them. Tallow is firm, brittle, and has a peculiar heavy odour. When pure it is white and nearly insipid; but the tallow of commerce has usually a yellowish tinge, which may be removed by exposure to light and air. Tallow is manufactured into candles and soap, and is much used in dressing leather, and in various processes of the arts. Britain imports tallow chiefly from the Australian colonies, Argentina, and the U. States. *Vegetable tallow* is contained in the seeds of various plants, one of the best known of which is the candle-berry (which see). See also *China Wax*, and next article.

Tallow-tree (*Stillingia sebifera*), a tree of the natural order Euphorbiaceæ, one of the largest, the most beautiful, and the most widely diffused of the plants found in China. From a remote period it has furnished the Chinese with the material out of which they make candles. The capsules and seeds are crushed together and boiled; the fatty matter is skimmed as it rises, and condenses on cooling. The tallow-tree has been introduced into the United States, and is almost naturalized in the maritime parts of Carolina. It has also been acclimatized by the French in Algeria. The tallow-tree of Malabar is *Vateria indica*. See *Vateria*.

Tally, a piece of wood on which notches or scores are cut, as the marks of number. In purchasing and selling it was once customary

for traders to have two sticks, or one stick cleft into two parts, and to mark with scores or notches on each the number or quantity of goods delivered, or what was due between debtor and creditor, the seller or creditor keeping one stick, and the purchaser or debtor the other. Before the use of writing, or before writing became general, this or something like it was the usual method of keeping accounts. In the exchequer of England tallies were used till late in the 18th century. An exchequer tally was an account of a sum of money lent to the government, or of a sum for which the government would be responsible. The tally itself consisted of a squared rod of hazel or other wood, having on one side notches, indicating the sum for which the tally was an acknowledgment. On two other sides opposite to each other, the amount of the sum, the name of the payer, and the date of the transaction, were written by an official called the writer of the tallies. This being done the rod was then cleft longitudinally in such a manner that each piece retained one of the written sides, and one half of every notch cut in the tally. One of these parts, the *counterstock*, was kept in the exchequer, and the other, the *stock*, only issued. When the part issued was returned to the exchequer (usually in payment of taxes) the two parts were compared, as a check against fraudulent imitation. This ancient system was abolished by 25 Geo. III. lxxii. The size of the notches made on the tallies varied with the amount. The notch for £100 was the breadth of a thumb, for £1 the breadth of a barleycorn. A penny was indicated by a slight slit.

Tally System, a mode of selling upon credit in which the purchaser agrees to pay for the purchase by fixed instalments at a certain rate, and both seller and purchaser keep books in which the circumstances of the transaction and the payment of the several instalments are entered, and which serve as a tally and counter-tally. This mode of doing business has lately increased enormously in all branches of trade.

Talma, FRANÇOIS JOSEPH, French tragedian, was the son of a Parisian dentist, and was born at Paris in 1763. In 1787 he made his début at the Comédie Française in the character of Séide in Voltaire's *Mahomet*. His greatest successes were achieved at the Théâtre Français (afterwards Théâtre de la République), which he and others founded in 1791. He enjoyed the intimacy

of Napoleon, and was the friend of Chénier, Danton, Camille Desmoulins, and other revolutionists. He died in 1826. Talma was the greatest modern tragic actor of France, and one of the earliest advocates of realism in scenery and costume.

Talmud, a Chaldaic word signifying 'doctrine,' and sometimes used to designate the whole teaching of the Jewish law, comprising all the writings included in what we call the Old Testament, as well as the oral law or Mishna, with its supplement or commentary the Gemara, but more frequently applied only to the Mishna and Gemara. The main body of the Talmud—in the second of these two senses—consists of minute directions as to conduct. Its contents are hence very miscellaneous, and they are as varied in their character as in their subject. Much of it is taken up with regulations of the most puerile nature, and not a little with details only fitted to excite disgust. In other parts again there are passages containing the loftiest expression of religious feeling, passages which are said to be the source of almost all that is sublime in the liturgy of the Church of Rome, and those liturgies which have been mainly derived from it. Interspersed throughout the whole are numerous tales and fables, introduced for the sake of illustration. The Jews are carefully instructed in it, and its very language is sometimes quoted and acknowledged in the New Testament. The injunctions referred to in the sermon on the mount as having been 'said by them of old time' (properly, the elders) are all from the Mishna. The Gemara was originally an oral commentary of the Mishna, as the Mishna itself was originally an oral commentary of the Mikra, or written law. It consisted of the explanations and illustrations which the teachers of the Mishna were in the habit of giving in the course of their lessons. These oral comments were handed down from age to age, differing of course in different localities, and gradually increasing in quantity; and they were at last committed to writing in two forms, the one called the Jerusalem and the other the Babylonian Gemara, or, with the addition of the Mishna, which is common to both, the Jerusalem and the Babylonian Talmud. The Jerusalem Talmud is the earlier and by much the smaller of the two. The language of both the Gemaras is a mixed Hebrew, but that of the Babylonian Gemara is much less pure than the other; in the narrative por-

tions, designed as popular illustrations of the other parts, it comes near the Aramaic or vernacular dialect of the Eastern Jews. The style is in both cases extremely condensed and difficult. The Mishna, with its corresponding Gemara, is divided into six orders or principal divisions. The subjects of these orders are agriculture, festivals, women, damages, holy things, and purifications. These orders are subdivided into sixty-three tracts, to which the Babylonian Gemara adds five others, thus containing sixty-eight tracts in all. Other divisions of the Talmud are the Halaka, the doctrinal and logical portion; Hagada, the rhetorical or imaginative portion; and Cabala, the mystical portion, including theosophy and magic. Many translations of parts of the Talmud have appeared.

Talpa. See *Mole*.

Talus, in geology, a sloping heap of broken rocks and stones at the foot of any cliff or rocky declivity.

Taman'dua, a species of ant-eater, the *Myrmecophaga tamandua* or *Tamandua tetradactyla*.

Tamarack. See *Larch*.

Tamarica'ceæ, a small natural order of polypetalous exogens. The species are either shrubs or herbs, inhabiting chiefly the basin of the Mediterranean. They have minute alternate simple leaves and usually small white or pink flowers in terminal spikes. They are all more or less astringent, and their ashes after burning are remarkable for possessing a large quantity of sulphate of soda. See *Tamarisk*.

Tam'arin, the name of certain South American monkeys. The tamarins are active, restless, and irritable little creatures, two of the smallest being the silky tamarin (*Midax rosalia*) and the little lion monkey (*M. leonina*), the latter of which, though only a few inches in length, presents a wonderful resemblance to the lion.

Tam'arind (*Tamarindus indica*), a large and beautiful tree of the East and West Indies, natural order Leguminosæ. It



Tamarind (*Tamarindus indica*).

is cultivated chiefly for the sake of its pods (tamarinds). The West Indian tamarinds are put into casks, with layers of sugar between them, or with boiling syrup poured over them, and are called prepared tamarinds. The East Indian tamarinds, which are most esteemed, are preserved without sugar. They are dried in the sun, or artificially with salt added.

Tam'arisk, the common name of shrubs of the genus *Tamarix*, the type of the natural order Tamaricaceæ. *T. gallica* is very abundant all round the Mediterranean, and is naturalized on some parts of the south coast of England. It attains a height of from 16 to 20 feet, has small flowers of a bright rose colour, and altogether has a very attractive appearance, which makes it very much sought after as an ornament for shrubberies and parks.

Tam'atave, the chief port on the eastern side of Madagascar. Pop. about 6000.

Tamaulipas (tá-mou-lé-pás), a state of Mexico, on the Gulf of Mexico, north of Vera Cruz; area, 28,659 square miles. The coast is low, but in the interior, towards the south, the surface becomes finely diversified by mountain, hill, and valley. The soil is generally fertile. Cattle in vast numbers are reared on the pastures. The foreign trade is carried on chiefly at the ports of Tampico and Matamoros. The capital is Ciudad Victoria. Pop. 218,948.

Tambookieland. See *Tembuland*.

Tambourine (tam-bu-rén'), a musical instrument of the drum species, much used among the Spanish and Italian peasants as well as elsewhere. It consists of a piece of parchment stretched over the top of a broad hoop, which is furnished with little bells. It is sounded by sliding the fingers along the parchment, or by striking it with the back of the hand or with the fist or the elbow.



Tambourine.

Tambour-work (French, *tambour*, a drum), a species of embroidery on muslin or other thin material, worked on circular frames which resemble drum-heads. The practice of tambouring is rapidly dying out, being replaced by pattern-weaving, by which tambour-work can be closely imitated.

Tambov, a government of Russia, south of Nijni-Novgorod and Vladimir, between the basins of the Oka and the Don; area,

25,676 sq. miles. It is one of the largest, most fertile, and most densely peopled provinces of Central Russia. More than two-thirds of the surface is arable. The principal crops are corn and hemp. Vast numbers of excellent horses, cattle, and sheep are reared. The chief industrial establishments are distilleries, tallow-melting works, sugar works, and woollen mills. Pop. 2,607,881.—**TAMBOV**, the capital, 263 miles south-east of Moscow, is built mostly of wood. It has a great trade in corn and cattle. Pop. 35,688.

Tamerlane. See *Timour*.

Tamias. See *Squirrel*.

Tamils, the name of a race which inhabits South India and Ceylon. The Tamils belong to the Dravidian stock of the inhabitants of India, and are therefore to be regarded as among the original inhabitants who occupied the country before the Aryan invasion from the north, but they adopted the higher civilization of the Aryans. The Tamil language is spoken not only in South India and Ceylon, but also by a majority of the Indian settlers in places further east, as Pegu and Penang. There is an extensive literature, the greater part of it in verse. Among the chief works are the *Kural* of Tiruvalluvar, an ethical poem, and the Tamil adaptation of the Sanskrit *Ramayana*.

Tamise (tā-mēz), a manufacturing town of Belgium, prov. E. Flanders, on the Scheldt. Pop. 13,200.

Tammany Ring, a political combination of New York, which, about 1870, under William M. Tweed, secured the control of the elections in that city and the management of the municipal revenues, which were extensively plundered. The frauds, amounting to many millions of dollars, were discovered in 1876. The name Tammany was given from the meeting-place, Tammany Hall, New York. The system has been flourishing again in recent times.

Tammuz, a proper name occurring in Scripture, but only once, in Ezekiel viii. 14, and generally identified with the Phœnician sun-god Adonis (which see). The death of Tammuz was celebrated by lamentations, his resurrection with frantic rejoicings mingled with the grossest debauchery. This idolatry appears to have been originally symbolical, connected with the death of nature in winter and its revival in spring.

Tammy, **TAMIS**, **TAMINE**, or **TAMINY**, a kind of woollen cloth highly glazed, used for making fine sieves employed in cooking, which are also called *tammies*. It is also

used under the names of *lasting* and *durant* for ladies' boots.

Tampa, a port of Florida, United States, on Tampa Bay, an inlet of the Gulf of Mexico; a flourishing business centre, seaport, and winter resort, the terminus of two railways; carries on a trade with ports on the Gulf and the Atlantic. Pop. 15,839.

Tampico, a seaport of Mexico, state of Tamaulipas, 225 miles N.N.W. Vera Cruz, at the mouth of the Panuco. The harbour (recently improved) is accessible for large vessels, and a flourishing trade is done. Two railways run inland. Pop. 16,813.

Tamsui, a seaport at the north end of the island of Formosa, one of the treaty ports, with a trade in tea. Pop. 95,000.

Tam-tam, or **TOM-ROU**, a cylindrical drum used in the East Indies. It is beaten upon with the fingers, or with the open hand. Public notices, when proclaimed in the bazaars of Eastern towns, are generally accompanied by the tam-tam.

Tamworth, a municipal borough and market-town of England, 20 miles north-west of Coventry, at the confluence of the Tame and Anker, partly in Staffordshire and partly in Warwickshire. The castle, now modernized, was an important fortress for many years after the Conquest. The church of St. Editha, in the Decorated style of the 14th century, was originally founded in the 8th century. Tamworth has given name to a parl. div. since 1885. Pop. 7271.

Tana, (1) a river in the extreme north of Norway, forming part of the boundary between it and Russia. (2) A river of E. Africa, within the British 'sphere of influence,' rising in Mount Kenia, navigable for about 100 miles in the rainy season.

Tanagers, passerine birds, genus *Tanagra*, family Fringillidæ, or finches, distinguished by the bill being of triangular shape at its base and arched towards its tip, and remarkable for their bright colours. They are chiefly found in the tropical parts of America.

Tan'ais. See *Don*.

Tananari'vo. See *Antananarivo*.

Tancred, son of the Marquis Odo the Good and Emma the sister of Robert Guiscard, born in 1078, was one of the most famous heroes of the first Crusade. He distinguished himself at the siege of Nicæa (1097), at the battle of Doryleum (July 1097), at the capture of Jerusalem (July 1099), and at Ascalon (August 12), and was appointed by Godfrey de Bouillon Prince of

TANGANYIKA — TANNA.

Galilee. He died in 1112, in his thirty-fifth year, of a wound received at Antioch. He is represented by Tasso in the Jerusalem Delivered as the flower and pattern of chivalry.

Tanganyika, a lake of Central Africa, lying to the south of Lake Albert Nyanza. It extends from about $3^{\circ} 25'$ to $8^{\circ} 40'$ s. lat., and from $29^{\circ} 20'$ to $32^{\circ} 20'$ e. lon. It is 420 miles long, has an average breadth of about 30 miles, and is 2700 feet above the level of the sea. The basin in which it lies is inclosed by an almost continuous series of hills and mountains. It is fed by numerous rivers and streamlets, and discharges by the river Lukuga into the Congo. There are several London Missionary Society stations on Tanganyika, and on the eastern shore is the town of Ujiji, in German East Africa. A carriage-road, 210 miles, runs to Nyassa. Tanganyika was discovered by Speke and Burton in 1858.

Tangent, in geometry, a straight line which touches or meets a circle or curve in one point, and which being produced does not cut it; a straight line drawn at right angles to the diameter of a circle, from the extremity of it, as HA in figure, which being continued at A , would merely touch and not cut the circle. In trigonometry the tangent of an arc is a straight line touching the circle of which the arc is a part, at one extremity of the arc, and meeting the diameter passing through the other extremity. Thus AH is the tangent of the arc AB , and it is also said to be the tangent of the angle ACB , of which AB is the measure. The arc and its tangent have always a certain relation to each other; and when the one is given in parts of the radius, the other can always be computed. For trigonometrical purposes tangents for every arc from 0 degrees to 90 degrees, as well as sines, cosines, &c., have been calculated with reference to a radius of a certain length, and these or their logarithms formed into tables. In the higher geometry the word tangent is not limited to straight lines, but is also applied to curves in contact with other curves, and also to surfaces.

Tanghin (*Tanghinia venenifera*), a tree of Madagascar, natural order Apocynaceæ, bearing a fruit the kernel of which, about the size of an almond, is highly poisonous.

Trial by tanghin was formerly used in Madagascar as a test of the guilt or innocence of a suspected criminal. The person undergoing the ordeal was required to swallow a small portion of the kernel. If his stomach rejected it he was deemed innocent, but if he died, as happened in most cases, he was deemed to have deserved his fate and suffered the punishment of his crime.

Tangier (tan'jër), a seaport of Morocco, on the Strait of Gibraltar. It stands on two heights near a spacious bay, and presents a very striking appearance from the sea, rising in the form of an amphitheatre. The harbour is a mere roadstead, but there is a large trade. The foreign ministers, chief consuls, &c., reside here; and there are modern hotels and other European institutions. In 1662 Tangier was annexed to the English crown as part of the dowry of the Infanta of Portugal, wife of Charles II., but in 1684 it was given up. Pop. 30,000.

Tangle, the common name of two species of sea-weed found on the shores of Britain, *Laminaria digitata* and *L. saccharina*.

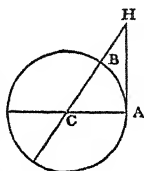
Tania. See *Zoan*.

Tanistry, a mode of tenure that prevailed among various Celtic tribes, according to which the tanist or holder of honours or lands held them only for life, and his successor was fixed by election. According to this custom the right of succession was not in the individual, but in the family to which he belonged; that is, succession was hereditary in the family, but elective in the individual.

Tanjore, a city in Hindustan, in the presidency of Madras, capital of the district of the same name, in a fertile plain, about 45 miles from the sea and 170 miles south by west of Madras. The fortified town, about 4 miles in circuit, contains the palace of the rajah, and outside of it is the British residency. Manufactures of silk, muslin, and cotton are carried on to a considerable extent. The town was besieged and taken by the British in 1773. Pop. 57,605.—The district of Tanjore has an area of 3654 sq. miles, and a population of 2,245,360. It is very fertile, and is regarded as the granary of the Madras territories.

Tank-worm, a nematode worm abounding in the mud in tanks in India, and believed to be the young of the *Filaria* or *Dracunculus medinensis*, or guinea-worm, a troublesome parasite on man. See *Guinea-worm*.

Tanna. See *Thana*.



Tannahill, ROBERT, a popular writer of Scottish songs, was born in Paisley in 1774, of parents in humble life, and was himself bred to the occupation of a weaver. In 1807 the first edition of his *Poems and Songs* was published, and was received very favourably by the public. A second edition, carefully revised, which he had prepared for the press, was refused by Constable of Edinburgh, and this tended to increase the melancholy from which he had been suffering; on the 17th of May, 1810, he committed suicide by drowning.

Tanner's Sumach. See *Coriaria*.

Tannhäuser (tän'hoi-zér), or **TANHÄUSER**, in old German legend, a knight who gains admission into a hill called the Venusberg, in the interior of which Venus holds her court, and who for a long time remains buried in sensual pleasures, but at last listens to the voice of the Virgin Mary, whom he hears calling upon him to return. The goddess allows him to depart, when he hastens to Rome to seek from the pope (Pope Urban) absolution for his sins. The pope, however, when he knows the extent of the knight's guilt, declares to him that it is as impossible for him to obtain pardon as it is for the wand which he holds in his hand to bud and bring forth green leaves. Despairing, the knight retires from the presence of the pontiff, and enters the Venusberg once more. Meanwhile the pope's wand actually begins to sprout, and the pope, taking this as a sign from God that there was still an opportunity of salvation for the knight, hastily sends messengers into all lands to seek for him. But Tannhäuser is never again seen. The Tannhäuser legend has been treated poetically by Tieck, and Richard Wagner has adopted it (with modifications) as the subject of one of his operas.

Tannic Acid, or **TANNIN**, a peculiar acid which exists in every part of all species of oaks, especially in the bark, but is found in greatest quantity in gall-nuts. Tannic acid, when pure, is nearly white, and not at all crystalline. It is very soluble in water, and has a most astringent taste, without bitterness. It derives its name from its property of combining with the skins of animals and converting them into leather, or tanning them. It is the active principle in almost all astringent vegetables, and is used in medicine in preference to mineral astringents, because free from irritant and poisonous action. The name is generally applied to a mixture of several substances.

Tanning, the operation of converting the raw hides and skins of animals into leather by effecting a chemical combination between the gelatine of which they principally consist and the astringent vegetable principle called tannic acid or tannin. The object of the tanning process is to produce such a chemical change in skins as may render them unalterable by those agents which tend to decompose them in their natural state, and in connection with the subsequent operations of currying or dressing to bring them into a state of pliability and impermeability to water which may adapt them for the many useful purposes to which leather is applied. The larger and heavier skins subjected to the tanning process, as those of buffaloes, bulls, oxen, and cows, are technically called *hides*; while those of smaller animals, as calves, sheep, and goats, are called *skins*. In preparing the hides and skins for tanning they are subjected to certain operations already described under *Leather*, after which the tanning proper begins. The various substances used for tanning are oak, fir, mimosa, and hemlock bark, sumach, myrobalans, divi-divi, valonia-nuts, cutch, kino, gambir, and oak-galls—all of which contain tannin. The impregnation of the hides with this tannin may be effected either by placing them between layers of bark (oak bark being the best) in a vat filled with water, or steeping them in a liquor containing a small at first, but steadily increasing proportion of tannin throughout a series of pits. This liquor usually consists of water in which the ground or crushed tanning material has been steeped. The raw hide takes about a year to prepare it for the best quality of leather. There is also a process called *tawing*, which is employed chiefly in the preparation of the skins of sheep, lambs, goats, and kids. In this process the skins are steeped in a bath of alum, salt, and other substances, and they are also sometimes soaked in fish-oil. The more delicate leathers are treated in this manner, those especially which are used for wash-leathers, kid gloves, &c. After the leather is tanned it is finished for use by the process of *currying* (which see). Various improvements have been attempted to be made in the art of tanning, such as the preparation of the skins by means of metallic solutions instead of by vegetable tannin; the forced absorption of the tan by applying pressure between cylinders; and the preparation of the skins by a chemical agent, so as to induce a quicker absorption

of the tan. It has been found, however, that the slow process followed by the old tanners produces leather far superior to that produced by the new and more rapid methods, though a fair leather for certain purposes may be produced in five to ten weeks.

Tanrec, or **TENREC** (*Centetes*), a genus of insectivorous mammals, resembling in outward appearance the European hedgehog, they being covered with bristles about an inch in length. These animals inhabit Madagascar. They hibernate like the European hedgehogs, and live in burrows, which they excavate by means of their strong claws.

Tansy (*Tanacetum vulgare*) is a well-known plant, being abundant in Britain and throughout Europe on the borders of fields and roadsides. It is a tall plant, with divided leaves and button-like heads of yellow flowers. Every part of the plant is bitter, and it is considered as tonic and anthelmintic, tansy-tea being an old popular medicine. It is now cultivated in gardens mainly for the young leaves, which are shredded down and employed to flavour puddings, cakes, &c.

Tanta, a town of Lower Egypt, situated on the railway about 50 miles N. of Cairo. It has many large public buildings, besides a palace of the Khedive, and is celebrated in connection with the great Moslem saint Seyyid-el-Bedawi, to whom a mosque is here erected. Tanta has three great annual fairs, which are held in January, April, and August, and at the latter 500,000 persons are said to congregate from the surrounding countries. Pop. 60,000.

Tan'talum, a rare metallic element discovered in the Swedish minerals tantalite and yttrio-tantalite; chemical symbol Ta, atomic weight 183. It was long believed to be identical with *niobium*, but their separate identity has been established.

Tan'talus, in Greek mythology, a son of Zeus, and king of Phrygia, Lydia, Argos or Corinth, who was admitted to the table of the gods, but who had forfeited their favour either by betraying their secrets, stealing ambrosia from heaven, or presenting to them his murdered son Pelops as food. His punishment consisted in being placed in a lake whose waters receded from his lips when he attempted to drink, and of being tempted by delicious fruit overhead which withdrew when he attempted to eat. Moreover, a huge rock for ever threatened to fall and crush him.

Tan'talus, a genus of wading birds of the

heron family. *T. loculator* is the wood-ibis of America, which frequents extensive swamps, where it feeds on serpents, young alligators, frogs, and other reptiles. The African tantalus (*T. ibis*) was long regarded as the ancient Egyptian ibis, but it is rare in Egypt, belonging chiefly to Senegal, and is much larger than the true ibis.

Tantras, a name of certain Sanskrit sacred books, each of which has the form of a dialogue between Siva and his wife. The tantras are much more recent productions than the Vedas, the oldest being long posterior even to the Christian era, although their believers regard them as a fifth Veda, of equal antiquity and higher authority. The Tantrikas or followers of the tantras indulge in mystical and impure rites in honour of Siva.

Taoism, or **TAOUISM**, a religious system formed in China by Lao-tse. He taught a comparatively pure morality, but in its later developments his doctrine is too often associated with magical rites and superstitious observances. See *Lao-tse*.

Taormi'na, a town, province of Messina, Sicily, on Monte Tauro, overlooking the Strait of Messina. Its chief interest is in the ancient theatre, sepulchres, reservoirs, &c., which are still in good preservation. Pop. 2500.

Tapajos (tä-pä-zhōs'), a river of Brazil, which flows through the province of Para, and enters the Amazon after a northward course of nearly 1200 miles, most of which is navigable.

Ta'pestry, a kind of woven hangings of wool and silk, often enriched with gold and silver, with worked designs, representing figures of men, animals, landscapes, &c., and formerly much used for lining or covering the walls and furniture of apartments, churches, &c. Tapestry is made by a process intermediate between weaving and embroidery, being worked in a web with needles instead of a shuttle. Short lengths of thread of the special colours required for the design are worked in at the necessary places and fastened at the back of the texture. In Flanders, particularly at Arras (whence the term *arras*, signifying 'tapestry'), during the 15th and 16th centuries, the art was practised with uncommon skill. The art of weaving tapestry was introduced into England near the end of Henry VIII's reign. During the reign of James I. a manufactory was established at Mortlake, which continued till the beginning of the 18th century. Recently a royal school of

TAPETI—TAPIR.

tapestry has been established at Windsor, and some excellent work has been done by Mr. W. Morris at Merton (Surrey). The first manufacture of tapestry at Paris was set up under Henry IV., in 1606 or 1607, by several artists whom that monarch invited from Flanders. But the most celebrated of all the European tapestry manufactures was that of the Gobelins, instituted under Louis XIV. (See *Bayeux Tapestry* and *Gobelins Manufactory*.) The term *tapestry* is also applied to a variety of woven fabrics having a multiplicity of colours in their design, which, however, have no other characteristic of true tapestry. The name of *tapestry carpet* is given to a showy and cheap two-ply or ingrain carpet, the warp or weft being printed before weaving so as to produce the figure in the cloth.

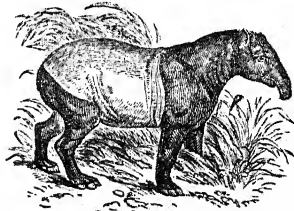
Tapeti, the Brazilian hare, the *Lepus Brasiliensis*, the only hare inhabiting South America.

Tape-worms, the name common to certain internal parasites (Entozoa) constituting the order Cestoidea or Teniada of the sub-kingdom Annuloida, found in the mature state in the alimentary canal of warm-blooded vertebrates. Tape-worms are composed of a number of flattened joints or segments, the anterior of which, or head (which is the true animal), is furnished with a circlet of hooks or suckers, which enable it to maintain its hold on the mucous membrane of the intestines of its host. The other segments, called *proglottides*, are simply generative organs budded off by the head, the oldest being furthest removed from it, and each containing when mature male and female organs. The tape-worm has neither mouth nor digestive organs, nutrition being effected by absorption through the skin. The length of the animal varies from a few inches to several yards. The ova do not undergo development in the animal in which the adult exists. They require to be swallowed by some other warm-blooded vertebrate, the ripe proglottides being expelled from the bowel of the host with all their contained ova fertilized. The segments or proglottides decompose and liberate the ova, which are covered with a capsule. After being swallowed the capsule bursts and an embryo, called a *proscœlex*, is liberated. This embryo, by means of spines, perforates the tissues of some contiguous organ, or of a blood-vessel, in the latter case being carried by the blood to some solid part of the body, as the liver or brain, where it sur-

rounds itself with a cyst, and develops a vesicle containing a fluid. It is now called a *scolex* or *hydatis*, and formerly was known as the *cystic worm*. The scolex is incapable of further development till swallowed and received a second time into the alimentary canal of a warm-blooded vertebrate. Here it becomes the head of the true tape-worm, from which proglottides are developed posteriorly by gemmation, and we have the adult animal with which the cycle begins. Eight true tape-worms occur in man, *Tenia solium*, the cystic form of which produces the measles of the pig, being the most common. Another, *T. mediocanellata*, is developed from the scolex, which causes measles in the ox. The tape-worm of the dog, *T. serrata*, is the adult form of the scolex which produces staggers in sheep. *T. Echinococcus* of the dog produces hydatids in man, through the development in man of its immature young. In all cases the only conclusive sign of tape-worm is the passage of one or part of one in the fæces. One mode of treatment for this disorder is, for an adult, a tea-spoonful of the extract of male-fern. A few hours thereafter a strong dose of castor-oil should be taken.

Tapio'ca, a farinaceous substance prepared from cassava meal, which, while moist or damp, has been heated for the purpose of drying it on hot plates. By this treatment the starch-grains swell, many of them burst, and the whole agglomerates in small irregular masses or lumps. In boiling-water it swells up and forms a viscous jelly-like mass. See *Cassava*.

Tapir, the name of ungulate or hoofed animals forming the family Tapiridae. The nose resembles a short fleshy proboscis; there are four toes to the fore-feet, and



Malay Tapir (*Tapirus malayanus*).

three to the hind ones. The common South American tapir (*Tapirus americanus*) is the size of a small ass, with a brown skin, nearly naked. It inhabits forests, lives much in

the water, conceals itself during the day, and feeds on vegetable substances. There are several other American species. The *T. malayanus* or *indicus* is found in the forests of Malacca and Sumatra. It is larger than the American species, and is a most conspicuous animal from the white back, rump, and belly contrasting so strongly with the deep sooty black of the rest of the body as, at a little distance, to give it the aspect of being muffled up in a white sheet. Fossil tapirs are scattered throughout Europe, and among them is a gigantic species, *T. giganteus*, Cuvier, which in size must have nearly equalled the elephant.

Tapping, or **PARACENTESIS**, a surgical operation commonly performed for dropsy, but also for empyema, and for the relief of other morbid effusions in natural or accidental cavities of the body. It consists in piercing the wall of the cavity with an instrument, commonly a trocar or a bistoury. The fluid usually flows out, but it is sometimes necessary to use an instrument which acts as a syringe.

Taprobane (tap-rob'a-nē), the ancient name of Ceylon. See *Ceylon*.

Tapti, or **TAPTEE**, a river in Hindustan, rises in the Nerbudda division of the Central Provinces, and after a course of about 460 miles falls by several mouths into the Gulf of Cambay, 20 miles below Surat and 30 miles south of the mouth of the Nerbudda.

Taqua-nut, the seed or nut of the South American tree *Phytolophus macrocarpa*, introduced into Britain under the name of vegetable ivory, and used as ivory.

Tar, a thick, dark-coloured, viscid product obtained by the destructive distillation of organic substances and bituminous minerals, as wood, coal, peat, shale, &c. Wood-tar, such as the Archangel, Stockholm, and American tars of commerce, is obtained by burning billets of wood slowly in a conical cavity at the bottom of which is a cast-iron pan into which the tar exudes. In Britain wood-tar is chiefly obtained as a by-product in the destructive distillation of wood for the manufacture of wood-vinegar (pyroligneous acid) and wood-spirit (methyl alcohol). It has an acid reaction, and contains various liquid matters, of which the principal are methyl-acetate, acetone, hydrocarbons of the benzene series, and a number of oxidized compounds, as carbolic acid. Paraffin, anthracene, naphthalene, chrysene, &c., are found among its solid products. It possesses valuable antiseptic properties, owing to

the creasote it contains, and is used extensively for coating and preserving timber, iron, and cordage. Coal-tar, which is largely obtained in gas manufacture, is also valuable inasmuch as it is extensively employed in the production of dyes, &c. See *Coal-tar* and *Aniline*.

Tara, or **TARO**, the native name given to plants of the genus *Colocasia*, natural order Araceæ, especially *C. esculenta* and *C. macrorrhiza*, cultivated in the Pacific Islands for their esculent root, which, though pungent and acrid raw, becomes palatable when cooked. A pleasant flour is also made of the roots or tubers, and the leaves are used as spinach. The name is also given to the allied *Caladium esculenta*, whose tuberous root and leaves are used in the same manner.

Tara Fern, a species of fern (*Pteris esculenta*) from the root or rhizome of which a flour was obtained which formed a staple article of food to the natives of New Zealand before the settlement by the British.

Tarai (ta-rī; 'moist land'), a moist and jungly tract of Northern India, running along the foot of the first range of the Himalayas for several hundred miles, with a breadth of from 2 to 15, infested by wild beasts, and generally unhealthy. The name was given distinctively to a district in the Kumaun division of the North-west (now United) Provinces, consisting of a strip of country of about 90 miles in length along the foot of the Himalayas, and about 12 miles in breadth; now comprised in the Naini Tal and Almora districts.

Tarana'ki (formerly *New Plymouth*), a provincial district of New Zealand, on the west coast of North Island. Its coast-line extends to 130 miles, and it has an area of 3339 sq. miles. The coast is almost without indentations, and has no good natural harbours. Nearly three-fourths of this district is covered by valuable forests, and the rest is adapted for cattle rearing. There is a good coal-field on the banks of the Mokau, and the titaniferous iron-sand, which lies from 2 to 5 feet deep along the sea-beach, is believed to be the purest iron ore known. The soil is excellent, and a moist climate and temperate atmosphere render vegetation luxuriant. New Plymouth is the chief town, and has direct railway communication with Wellington and other parts of the colony. Mount Egmont, an extinct volcano, in the south-west, where the surface is most elevated, attains a height of 8270 feet, and is

TARANTASS—TARGET.

in many respects the most remarkable mountain in the colony. Pop. 37,842.

Tarantass', a large covered travelling carriage without springs, but balanced on long poles which serve the purpose, and without seats, much used in Russia.

Tarantella, a swift, whirling Italian dance in six-eight measure.

Taranto (anciently *Tarentum*), a fortified seaport of S. Italy, in the province of Lecce, on a rocky peninsula at the northern extremity of the gulf of same name. It is well built, and contains a cathedral and several



other churches, a diocesan seminary, and several hospitals. The manufactures include linen, cotton, velvet, muslin, and gloves. Taranto is now a station of the Italian navy, with a naval arsenal, &c. The ancient Tarentum was founded by the Greeks in B.C. 708, and became a powerful city. It was captured by the Romans B.C. 272, and remained a notable Roman town until the downfall of the empire. Pop. 30,000.

Tarantula, a kind of spider, the *Lycosa tarantula*, found in some of the warmer parts of Italy. When full grown it is about the size of a chestnut, and is of a brown colour. Its bite was at one time supposed to be dangerous, and to cause a kind of dancing disease; it is now known not to be worse than the sting of a common wasp.

Tarapacá, a coast province of Northern Chili, containing deposits of nitre and borax and silver mines; area, 19,300 square miles. Capital, Iquique. Pop. 101,000.

Tarare (tà-ràir), a town of France, in the department of the Rhone, 20 miles north-west of Lyons. It is well built, and has important manufactures of muslins, silks, velvets, &c. Pop. 11,650.

Tarascon, a town of Southern France,

department of Bouches-du-Rhône, on the Rhone, opposite Beaucaire, 50 miles N.W. of Marseilles. Pop., with Beaucaire, 13,700.

Taraxacin, a bitter crystallizable principle contained in the milky juice of the dandelion (*Leontodon Taraxacum*), especially in the juice of the roots. It possesses tonic, aperient, and diuretic properties.

Tarazona, an episcopal city of Spain, in the province of Saragossa, 57 miles W.N.W. of the town of Saragossa, on the Queiles. There is here an ancient episcopal palace and a cathedral, founded about the 13th century. Pop. 8790.

Tarbes (tárb), a town of France, capital of the department of Hautes Pyrénées, situated 110 miles south of Bordeaux, on the left bank of the Adour. Its principal edifices are the cathedral, and the church of St. John (14th century). The manufactures embrace leather, woollens, machinery, weapons, &c. Pop. 25,700.

Tarboosh, a red woollen skull-cap or fez, usually ornamented with a blue silk tassel, and worn by the Egyptians, Turks, and Arabs.

Tardigrada ('slow steppers'), the name applied by Cuvier to the family of edentate mammals, which includes the existing sloths and the extinct Megatherium.

Tare, the common name of different species of *Vicia*, a genus of leguminous plants, known also by the name of *vetch*. There are numerous species and varieties of tares or vetches, but that which is found best adapted for agricultural purposes is the common tare (*Vicia sativa*), of which there are two principal varieties, the summer and winter tare. They afford excellent food for horses and cattle, and hence are extensively cultivated throughout Europe. (See *Vetch*.) The tare mentioned in Scripture (Mat. xiii. 36) is supposed to be the *Lolium temulentum* or darnel (which see).

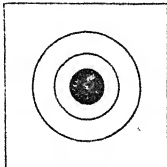
Tare, in commerce, a deduction made from the gross weight of goods as equivalent to the real or approximate weight of the cask, box, bag, or other package containing them. Tare is said to be *real* when the true weight of the package is known and allowed for, *average* when it is estimated from similar known cases, and *customary* when a uniform rate is deducted.

Taren'tula. See *Tarantula*.

Tarentum. See *Taranto*.

Target, (1) a shield or buckler of a small kind, such as those formerly in use among the Highlanders, which were circular in form,

cut out of ox-hide, mounted on strong wood, strengthened by bosses, spikes, &c., and often covered externally with a considerable amount of ornamental work. (2) The mark set up to be aimed at in archery, musketry, or artillery practice and the like. The targets used in rifle practice in Britain are generally square or oblong metal plates, and are divided into three or more sections, called *bull's eye*, *inner* (or *centre*), and *outer*, counting from the centre of the target to its edges; some targets have an additional division (called a *magpie*), situated between the outer and the inner. It is the marksman's aim to put his shots as near the central point as possible, as if he hits the bull's-eye there are counted in his favour 5 points, the centre 4 points, the magpie 3 points, and the outer 2 points, or some similar proportions.



Target.

Targum, a translation or paraphrase of the Hebrew Scriptures in the Aramaic or Chaldean language or dialect, which became necessary after the Babylonian captivity, when Hebrew began to die out as the popular language. The Targum, long preserved by oral transmission, does not seem to have been committed to writing until the first centuries of the Christian era. The most ancient and valuable of the extant Targums are those ascribed to or called after Onkelos and Jonathan Ben Uzziel. All the Targums taken together form a paraphrase of the whole of the Old Testament, except Nehemiah, Ezra, and Daniel.

Tari'fa, a maritime town of Spain, in Andalusia, 52 miles south-east of Cadiz, and the most southerly town in Europe. It is surrounded by fortifications built by the Moors, and contains a very ancient Moorish castle. Pop. 5000.

Tar'iff, a list or table of duties or customs to be paid on goods imported or exported, whether such duties are imposed by the government of a country or agreed on by the governments of two countries holding commerce with each other. The tariff depends upon the commercial policy of the state by which it is framed, and the details often rapidly fluctuate. See *Supp.*

Tarlatan, a thin and fine fabric of cotton, mostly used for ladies' ball dresses. It is cheap, but does not stand washing.

Taro, a plant of the genus *Colocasia*. See *Tura*.

Tarn, a river of Southern France, which rises on the south slope of Mount Lozère, near Florac, in the department of Lozère; flows through the departments of Aveyron, Tarn, Haute-Garonne, and Tarn-et-Garonne; and finally joins the Garonne. Its whole course is 230 miles, of which about 100 miles, beginning at Alby, are navigable.

Tarn, a department of Southern France, named from the above river; area, 2218 sq. miles. The surface is intersected by hills, which generally terminate in flat summits, on which, as well as their sides, cereals and vines are cultivated. The minerals include iron and coal, both of which are partially worked. Woollens, linens, hosiery, &c., are manufactured. The capital is Alby. Pop. 332,093.

Tarn-et-Garonne, a department of France, named after its two chief rivers; area, 1436 square miles. This department belongs to the basin of the Garonne, which traverses it south to north-west, and receives within it the accumulated waters of the Tarn and Aveyron, which are both navigable. The arable land raises heavy crops of wheat, maize, hemp, tobacco, grapes, and fruit of all kinds. The most important manufactures consist of common woollen cloth and serge, linen goods, silk hosiery, cutlery, leather, &c. Montauban is the capital. Pop. 195,669.

Tarnopol', a town, Austria, Galicia, on the left bank of the Sereth, 80 miles E.S.E. of Lemberg. It contains a Russian Catholic and a Greek Catholic church, castle, Jesuit college, gymnasium, &c. The inhabitants are chiefly employed in agriculture. Pop. 30,368.

Tarnow, a town, Austrian Galicia, on a height above the right bank of the Biala, 48 miles E.S.E. of Cracow. It is well built, is the see of a bishop, has a cathedral, monastery, gymnasium, synagogue, infirmary, and manufactures of linen and leather. Pop. 31,548.

Tarnowitz (tár'no-vits), a town of Prussia, in the province of Silesia, not far from the Polish frontier, with mines of iron and lead. Pop. 11,858.

Taro, a plant of the genus *Colocasia*. See *Tura*.

Tarpan, the wild horse of Tartary, belonging to one of those races which are by some authorities regarded as original. They are not larger than an ordinary mule. The colour is invariably tan or mouse, with black mane and tail. During the cold season their

hair is long and soft, but in summer it falls much away. They are sometimes captured



Tarpan.

by the Tartars, but are reduced with great difficulty to subjection.

Tarpau'lin, canvas well coated with tar, and used to cover the hatchways, boats, &c., on shipboard, and also to protect agricultural produce, goods in transit, &c., from the effects of the weather.

Tarpeian Rock, a precipitous rock forming part of the Capitoline Hill at Rome over which persons convicted of treason to the state were hurled. It was so named, according to tradition, from *Turpeia*, a vestal virgin of Rome, and daughter of the governor of the citadel on the Capitoline, who, covetous of the golden bracelets worn by the Sabine soldiery, opened the gate to them on the promise of receiving what they wore on their left arms. Once inside the gate they threw their shields upon her, instead of the bracelets. She was buried at the base of the Tarpeian Rock.

Tarpon, or **TARPUM**, the *Megalops atlanticus*, a herring-shaped fish found on the southern coasts of the United States and in the West Indies. It reaches a length of 5 or 6 feet, and from a hundred to several hundred pounds weight, and is of giant strength. Though too coarse ordinarily for food, it is a great attraction to anglers. Its scales, which are of great size, are now largely used in ornamental work.

Tarquinius, **LUCIUS**, surnamed *Priscus* (the first or the elder), in Roman tradition the fifth king of Rome. The family of Tarquinius was said to have been of Greek extraction, his father, Demaratus, being a Corinthian who settled in Tarquinii, one of the chief cities of Etruria. Having removed with a large following to Rome, Tarquinius became the favourite and confidant of the

Roman king, Ancus Martius, and at his death was unanimously elected his successor. According to Livy he made war with success on the Latins and Sabines, from whom he took numerous towns. His reign was distinguished by the construction of the Cloaca Maxima, the Forum, the wall round the city, and, as is supposed, he commenced the Capitoline Temple. After a reign of about thirty-six years he was killed by assassins employed by the sons of Ancus Martius in B.C. 578.

Tarquinius, **LUCIUS**, surnamed *Superbus* ('the proud'), the last of the legendary kings of Rome, was the son of Lucius Tarquinius Priscus. Tarquin, on reaching man's estate, murdered his father-in-law, King Servius Tullius (the date usually given for this event is B.C. 534), and assumed the regal dignity. He abolished the privileges conferred on the plebeians; banished or put to death the senators whom he suspected, never filled up the vacancies in the senate, and rarely consulted that body. He continued the great works of his father, and advanced the power of Rome abroad both by wars and alliances. By the marriage of his daughter with Octavius Mamilius of Tusculum, the most powerful of the Latin chiefs, and other political measures, he caused himself to be recognized as the head of the Latin confederacy. After a reign of nearly twenty-five years a conspiracy broke out by which he and his family were exiled from Rome (B.C. 510), an infamous action of his son Sextus being part of the cause of the outbreak. (See *Lucretia*.) He tried repeatedly, without success, to regain his power, and at length died at Cumæ in 495 B.C.

Tarragon (*Artemisia Dracuncululus*), a strong erect perennial plant of the composite order, a native of Siberia, cultivated in gardens for flavouring dishes.

Tarrago'na, a seaport and fortress, Spain, capital of prov. Tarragona, on the Francoli, at its mouth in the Mediterranean. The chief building is the cathedral, a fine Romanesque edifice partly of the 12th century. The town was founded by the Phœnicians, and was long important under the Romans. In its environs are an ancient amphitheatre, a circus, an aqueduct, &c. It was taken and sacked by the French under Suchet in 1811. It has a trade in corn, wine, fruit, &c. Pop. 26,281.

Tarra'sa, a town of Spain, prov. of Barcelona, with manufactures of cottons and woollens. Pop. 15,372.

Tarshish, a place frequently mentioned in the Old Testament. It is now generally identified by biblical critics with the Tartessus of the Greek and Roman writers, a district in Southern Spain, near the mouth of the Guadalquivir, settled by the Phœnicians.

Tarsia-work, a kind of mosaic wood-work or marquetry much in favour in Italy in the 15th century. It was executed by inlaying pieces of wood of different colours and shades into panels of walnut-wood, so as to represent landscapes, figures, fruits, flowers, &c. At Sorrento and other places the manufacture of wood-mosaic, in modern times, has become celebrated.

Tarsius, a genus of quadrumanous mammals of the lemur family inhabiting the Eastern Archipelago. In this genus the



Tarsier (*Tarsius spectrum*).

bones of the tarsus are very much elongated, which give the feet and hands a disproportionate length. *Tarsius spectrum*, the tarsier, seems to be the only species known. It is about the size of a squirrel, fawn-brown in colour, with large ears, large eyes, and a long tufted tail. It is nocturnal in its habits, lives among trees, and feeds upon lizards.

Tarsus, in anatomy, that part of the foot which in man is popularly known as the

ankle, the front of which is called the instep. It corresponds with the wrist of the upper limb or arm, and is composed of seven bones. (See *Foot*.) In insects the tarsus is the last segment of the leg. It is divided into several joints, the last being generally terminated by a claw, which is sometimes single and sometimes double. In birds the tarsus is that part of the leg (or properly the foot) which extends from the toes to the first joint above; the shank.

Tarsus, an ancient city of Asia Minor, the capital of Cilicia, now in the province of Adana, in Asiatic Turkey. The Apostle Paul was born, and Julian the Apostate was buried there. Its inhabitants enjoyed the privileges of Roman citizens, and the city even became a rival of Athens, Antioch, and Alexandria. It stands on the Cydnus, has a flourishing trade, and is connected by railway with Adana and the port of Mersina. Pop. 25,000.

Tartan, a kind of vessel used in the Mediterranean. It is furnished with a single mast on which is rigged a large lateen sail; and with a bowsprit and fore-sail. When the wind is aft a square sail is generally hoisted.

Tartan, a well-known species of cloth, checkered or cross-banded with threads of various colours. It was originally made of wool or silk, and constituted the distinguishing badge of the Scottish Highland clans, each clan having its own peculiar pattern. An endless variety of fancy tartans are now manufactured, some of wool, others of silk, others of wool and cotton, or of silk and cotton.

Tartar, the substance called also *argol* or *argol*, deposited from wines incompletely fermented, and adhering to the sides of the casks in the form of a hard crust. When purified it forms cream of tartar (*Cremor tartari*), and is an impure potassic hydric tartrate, $\text{KHC}_4\text{H}_4\text{O}_6$. (See *Argol*, *Cream of Tartar*.) *Tartar emetic* is a double tartrate of potassium and antimony, and is an important compound used in medicine as an emetic, purgative, diaphoretic, sedative, febrifuge, and counter-irritant. *Tartar of the teeth* is an earthy-like substance which occasionally concretes upon the teeth, and is deposited from the saliva.

Tartaric Acid ($\text{C}_4\text{H}_2\text{O}_6$), the acid of tartar. It exists in grape juice, in tamarinds, and several other fruits; but principally in bitartrate of potassium, or cream of tartar, from which it is usually obtained. It crys-

TARTARS—TASMANIA.

tallizes in large rhombic prisms, transparent and colourless, and very soluble in water. It is inodorous and very sour to the taste. When strongly heated in a flask it decomposes, giving rise to new acids. Its aqueous solution reacts with most metals, such as zinc or iron, which decompose hydrochloric acid. Four distinct modifications are known. These are characterized mainly by the action of their solutions on polarized light; they are dextro- or ordinary tartaric acid, levo-tartaric acid, para-tartaric or racemic acid, and meso-tartaric acid; the last two of which are optically inactive. Tartaric acid is largely employed as a discharge in calico-printing, and for making soda-water powders and baking powders. In medicine it is used in small doses as a refrigerant.

Tartars. See *Tatars*.

Tartarus, a deep and sunless abyss, according to Homer and the earlier Greek mythology, as far below Hades as earth is below Heaven. It was closed by iron gates, and in it Jupiter imprisoned the rebel Titans. Later poets describe Tartarus as the place in which the spirits of the wicked receive their due punishment; and sometimes the name is used as synonymous with Hades, or the lower world in general.

Tartary, a name formerly applied to the wide band of country extending through Central Asia from the seas of Japan and Okhotsk in the east to the Caspian on the west, and including Manchouria, Mongolia, Turkestan, and all the south part of Russian Asia. It was used sometimes even to include a large portion of South-eastern Russia. In a restricted sense it is identical with Turkestan. It received its name from the Tartars or Tatars. See *Tatars*.

Tartrate, a salt of tartaric acid. Some of the tartrates are of considerable importance, such as tartar emetic and Rochelle salts. See *Tartar*, *Rochelle Salts*.

Tarudant, a town of Morocco, at the southern foot of the Atlas, about 30 miles east from the Atlantic. Pop. 8300.

Tashkent', or TASHKEND', a town of Asiatic Russia, in the government of Turkestan, formerly in the khanate of Khokand, on the Tchirshik, near its confluence with Sir Daria or Jaxartes, in a fertile oasis. It is surrounded by a lofty wall of dried bricks, about 12 miles in circuit, and is entered by twelve gates. The streets are very narrow, and the houses, composed of mud, are mean-looking. The principal buildings are the castle, several large mosques, a bazaar, nu-

merous colleges, &c. The manufactures are silks, cottons, iron goods, &c. The trade, carried on chiefly by caravans, partly by railway, is very extensive. Tashkent was occupied by Russia in 1865, and a Russian quarter has grown up. Pop. about 156,414.

Tasmania, formerly Van Diemen's Land, an island in the Southern Ocean, fully 100 miles south of Australia, from which it is separated by Bass's Strait; greatest length, 186 miles; mean breadth, 165 miles; area, 24,330 square miles, or including islands, 26,215. The island may be roughly described as heart-shaped. The coasts, which are all much broken and indented, have some excellent harbours. The islands belonging to Tasmania are numerous, the principal being the Furneaux group, on the north-eastern extremity. Tasmania is traversed by numerous mountain ranges, the chief summits of which are Cradle Mountain, 5069 feet; the Frenchman's Cap, 4756 feet; and Ben Lomond, 5010 feet. The prevailing rocks are crystalline, consisting of basalt, granite, gneiss, quartz, &c. The chief rivers are the Derwent, the Huon, the Arthur, and the Tamar. The chief lake is Great Lake, which covers an area of 28,000 acres; Lake Sorell, 12,800 acres; Lake St. Clair, 10,000 acres. The climate is very mild. At Hobart snow rarely falls, though Mount Wellington, that overlooks it, is frequently coated with snow even in the summer months. In December, January, and February, the summer months, during which there is little rain, the average temperature is 62°, extreme 100° to 110°. The mean temperature throughout the year is about 55°4. The average rainfall is about 24·05 inches. Much of the soil of Tasmania is well adapted for cultivation. Wheat, oats, barley, potatoes, pease, beans, and hops are largely cultivated, and the fruit includes grapes, cherries, plums, quinces, mulberries, peaches, apricots, walnuts, filberts, almonds, &c. Fruit-preserving forms an important industry, and green fruit is largely exported. Large areas are also devoted to grazing. The number of sheep exceeds 1,600,000, and there are many cattle. Kangaroos and other animals of the pouched kind are numerous. There are two marsupial carnivorous animals called the Tasmanian wolf and the Tasmanian devil, both of which are destructive to sheep. Another marsupial carnivore is the dasyure or native cat. Rabbits have unfortunately been introduced. The natural forests are chiefly of the eucalyptus or gum-

TASMANIA.

tree, pine, and acacia tribe. Among the minerals are gold, silver, copper, iron, tin, coal, freestone, limestone, and roofing slate. Mount Bischoff tin mine is a notably rich one. Tasmanian coal is now used on the railways. The staple export from Tasmania is copper, and the other articles include gold, silver, tin, wool, timber, fruit, hops, hides, and bark. The total exports for 1906 were £3,752,500, and the imports £3,030,510. The first line of railway was opened in 1871, and there are now over 680 miles completed. The government has about 2000 miles of telegraph line in operation. The colony is divided into eighteen counties, which are again subdivided into parishes. Another division is into electoral districts for returning members to the legislative council and house of assembly. Hobart, the capital, on a fine inlet of the south coast, and Launceston, on an inlet of the north, are the chief towns. Tasmania, while one of the constituent states of the Commonwealth of Australia, has a legislative council and house of assembly of its own, called the parliament of Tasmania. The legislative council is composed of seventeen members, and the house of assembly of thirty-five members, the latter being elected for three years, and all being paid. The governor is appointed by the crown, and he has a responsible cabinet of six members: the premier, chief secretary, treasurer, attorney-general, minister of land and works, and another. The annual revenue and expenditure balance at about £870,000. The public debt stands at £9,700,000. Nearly half of the colonists belong to the Church of England, which numbers (1904) 89,345 members. There are 32,355 Roman Catholics, 26,952 Methodists, 12,285 Presbyterians, and several smaller bodies. Education is compulsory, and besides elementary schools there are a number of superior schools or colleges, two technical schools, and a poorly equipped university. Tasmania was discovered in 1642 by Abel Jansen Tasman, who named it after Van Diemen, the governor of the Dutch East Indies. It was visited by Cook in 1769, and during the next twenty years by various navigators. In 1797

Bass discovered the strait which has been called after him. The first settlement was made in 1803 by a guard with a body of convicts, who settled at Rest-down, but afterwards removed to the site now occupied by Hobart. The development of the country made slow progress until the land was divided into small allotments and farming stock and government



pensions reckoned as capital. Convict labour was supplied, and at a very moderate expense farms were cleared for cultivation. Sheep, cattle, and horses were introduced, and the raising of stock has always been carried on with great success. Until 1824 Tasmania was a dependency of New South Wales, but in that year it was made an independent colony. For a series of years the prosperity of the colony was retarded by the hostility of the natives and the depredations of escaped convicts, known by the name of bushrangers. The aborigines have ceased to exist, in 1853 transportation was abolished, and about the same time the name of Tasmania was officially adopted on the petition of the colonists. When gold was discovered in Australia in 1851, a rapid emigration from Tasmania to Australia took place. This greatly checked

TASMANIAN DEVIL—TATARS.

its prosperity, but only for a time. It entered the Commonwealth of Australia in 1901. Pop. 180,200.

Tasmanian Devil. See *Dasyurus*.

Tasmanian Wolf. See *Thylacine*.

Tasmanite, a translucent, reddish-brown fossil resin, occurring in Tasmania.

Tasmannia, a genus of plants, consisting of one Tasmanian and two Australian shrubs, nat. order Magnoliaceae. The Tasmanian species, *T. odorata*, possesses aromatic qualities, particularly in its bark. Its fruit is used by the colonists for pepper.

Tassisudon, capital of Bhutan State, and situated on the Godāda river about 130 miles N.W. of Godipāra. There is a palace where the Deb Rājā resides.

Tasso, BERNARDO, Italian epic and lyric poet, father of the more famous Torquato, born of an ancient family at Bergamo in 1493; was educated with great care; entered the service of Guido Rangone, general of the pope, as a political emissary; and became secretary to the Prince of Salerno, whom he accompanied to Tunis. In 1539 he married Porzia de Rossi and retired to Sorrento. Subsequently he received the patronage of the Duke of Urbino, and in 1563 the Duke of Mantua appointed him governor of Ostiglia, where he died in 1569. He published numerous lyric poems, but his chief work is the epic of *L'Amadigi*, founded on the story of Amadis de Gaul.

Tasso, TORQUATO, an Italian epic poet, son of the preceding, was born at Sorrento 1544. He was early sent to the school of the Jesuits at Naples, and subsequently pursued his studies under his father's superintendence at Rome, Bergamo, Urbino, Pesaro, and Venice. At the age of sixteen he was sent to the University of Padua to study law, but at this time, to the surprise of his friends, he produced the *Rinaldo*, an epic poem in twelve cantos. The reputation of this poem procured for Torquato an invitation to the University of Bologna, which he accepted. Here he displayed an aptitude for philosophy, and began to write his great poem of *Gierusalemme Liberata* (Jerusalem Delivered). While engaged on it he secured a patron in Cardinal Louis d'Este, to whom he had dedicated his *Rinaldo*. He was introduced by the cardinal to the court of Alfonso II. of Ferrara. Here he remained from 1565 to 1571, when he accompanied the cardinal on an embassy from the pope to Charles IX. of France. Having quarrelled with his patron, Tasso returned to Ferrara,

and in 1573 brought out the *Aminta*, a pastoral, which was represented at the court. In 1575 he completed his epic of *Gierusalemme Liberata*. About this time he became a prey to morbid fancies, believed that he was persistently calumniated at court, and systematically misrepresented to the Inquisition. To such a pass, indeed, had this mania come in 1577 that the poet drew his poignard upon one of the domestics of the Duchess of Urbino. He was immediately arrested, but was set at liberty after two days' confinement. At his own request he returned to Ferrara, to the convent of St. Francis; but from here he made his escape, and travelled in disguise to his native place, Sorrento, where he stayed with his sister Cornelia. He again asked permission to return to Ferrara, a request which the duke coldly granted. But in his excited and jealous condition of mind Tasso found it impossible to re-establish the old friendly relationship at the court. He fled from Ferrara again, but again returned. So outrageous had his conduct now become that he was seized by the duke's orders and confined as a madman in the hospital of St. Anne at Ferrara. Here he remained from 1579 to 1586, until he was released at the solicitation of Vincent di Gonzaga. Broken in health and spirit, he retired to Mantua, and then to Naples. Finally, in 1595, he proceeded to Rome at the request of the pope, who desired him to be crowned with laurel in the capitol, but the poet died while the preparations for the ceremony were being made. Tasso wrote numerous poems, but his fame rests chiefly on his *Rime*, or lyrical poems, his *Aminta*, and his *Gierusalemme Liberata* (translated into English by Fairfax). His letters are also interesting.

Tasso'sni, ALESSANDRO, Italian poet, born 1565, died 1635; chiefly known from his mock-heroic poem *La Secchia Rapita* (The Stolen Bucket), founded on an incident that gave rise to war between the Modenese and Bolognese in the 13th century.

Taste, the sense by which we perceive the relish or savour of a thing. The organs of this special sense are the *papilla*, or processes on the surface of the tongue, and also certain parts within the cavity of the mouth and the throat, as the soft palate, the tonsils, and the upper part of the pharynx. See *Tongue*.

Tatar-Pazarjik, a town in Southern Bulgaria on the Maritza. Pop. 17,500.

Tatars, or TARTARS, a vague term with no ethnological significance usually applied

to certain roving tribes which inhabited the steppes of Central Asia. More specifically, however, Tatar or Ta-ta appears to have been the name of a tribe of Mongols who occupied about the 9th century a district of Chinese Tartary on the Upper Amur. The true Tatars formed part of the horde of Genghis Khan, when that conqueror carried his arms from the country known as Chinese Tartary to Europe, as well as to the successive hordes of similar origin who followed in their footsteps, and to the districts from which they came, or in which they settled; hence the names of Chinese Tartary, Independent Tartary, and European or Little Tartary, which comprised most of the Russian governments of Orenburg, Astrakhan, Ekaterinoslav, the Cossack provinces, and the Crimea.

Tate, NAHUM, English poet, was born in Dublin about the year 1652; received his education in Trinity College; went to London, where he engaged in literary pursuits; was appointed poet laureate; and died in the Mint, whither he had retired from his creditors, in 1715. He was the author of several dramatic pieces; assisted Dryden in the second part of *Abraham and Achitophel*; altered and arranged Shakspeare's King Lear for the stage; and wrote, in conjunction with Dr. Nicholas Brady, the metrical version of the Psalms which used to be appended to the English Book of Common Prayer.

Tatian, a heresiarch of the 2d century, was born in Assyria about 120, and died about 172. He was educated in Greek philosophy; travelled extensively; caused himself to be initiated in the rites of various religions; and eventually embraced Christianity. Tatian became a disciple of Justin, after whose martyrdom he left Rome and journeyed into Mesopotamia, where he preached certain Gnostic and heretical doctrines. He seems to have disbelieved in the divinity of Christ, and his teaching inculcated abstinence from wine, from animal flesh, and from marriage. As a Christian apologist he wrote *Oratio ad Græcos*, which is still extant, and his *Diatessaron* seems to prove the existence of four gospels about the middle of the 2d century.

Tatius, ACHILLES. See *Achilles Tatius*.

Tatouay, a kind of armadillo (*Dasypus tatouay*, or *Xenurus unicinctus*) remarkable for the undefended state of its tail, which is devoid of the bony rings that inclose this member in the other armadillos, being only covered with brown hair.

Tatra. See *Carpathian Mountains*.

Tatta, a town in Karachi District, Sind, on the Indus, about 50 miles east of Karachi. Tatta has some manufactures of cotton and silk goods, but its commercial importance has greatly declined. Pop. 10,000.

Tattersall's, Knightsbridge Green, London, is the great metropolitan mart for horses, and head-quarters of the turf, removed in 1865 from Grosvenor Place, where it was established by Richard Tattersall in 1773. A subscription-room is open for betters on the turf, where they make and settle their bets.

Tattie, in the East Indies, a thick mat or screen, usually made of the sweet-scented cuscus-grass, and fastened upon a bamboo frame, which is hung at a door or window, and kept moist so as to cool the apartment.

Tatting, a kind of narrow lace used for edging, woven or knitted from sewing-thread, with a shuttle-shaped instrument.

Tattoo', a beat of drum and bugle-call at night, giving notice to soldiers to repair to their quarters in garrison or to their tents in camp.

Tattooing, a practice common to several uncivilized nations, ancient and modern, and to some extent employed among civilized peoples. It consists in pricking the skin in a design, and introducing into the wounds coloured liquids, gunpowder, or the like, so as to make it indelible. This practice is very prevalent among the South Sea Islanders, among whom are used instruments edged with small teeth, somewhat resembling those of a fine comb. Degrees of rank are sometimes indicated by the greater or less surface of tattooed skin.

Tauchnitz (touh'nits), BERNHARD CHRISTIAN, BARON, German publisher, born 1816. His establishment at Leipzig, founded in 1837, is widely known from the collection of British authors issued from it, which numbers over 3000 vols., and is continually increasing. Baron Tauchnitz was British consul-general for Saxony. He died in 1895 leaving a son in the business.

Taunton, a parl. and mun. borough, Somerset, England, on the Tone, 45 miles s.s.w. of Bristol. The principal buildings and institutions are the parish churches of St. James and St. Mary Magdalene; a Wesleyan and a Congregational College; the old castle, now containing an archaeological and natural history museum; an old market-house; the Shire Hall; a hospital, &c. The town was long celebrated for woollens;

it now manufactures silks and gloves, has foundries, coach-works, breweries, &c. Taunton is of great antiquity, and was a residence of West Saxon kings. Jeffreys held his 'bloody assize' here. It returns one member to parliament. Pop. 21,078.

Taunton, a town, capital of Bristol county, Massachusetts, United States, about 33 miles south of Boston. It is well built and contains a great number of handsome edifices. The manufactures consist of locomotives, cotton machinery, Britannia ware, nails, &c., and it has iron-works, cotton and paper mills, print-works, foundries, &c. Pop. 31,036.—

Taurus, a mountain range of Western Germany, mainly in the Prussian province of Hessen-Nassau, extending eastward from the Rhine, north of the Main; highest summit, Great Feldberg, 2886 feet. It is well wooded, and exhibits much picturesque scenery.

Taurida, a government in the south of Russia, bounded north by Ekaterinoslaf; east by the Sea of Azof; south-east, south, and west by the Black Sea; and north-west by the government of Kherson; area, 24,539 square miles. It is very irregular in shape and may be regarded as one large peninsula, subdivided into two minor peninsulas, one of which is the Crimea. It is watered by the Dnieper; the northern peninsula consists almost entirely of an extensive steppe, and the chief occupation of the inhabitants, who consist of Russians, is cattle-breeding and agriculture. Pop. 1,443,566. The capital is Simferopol.

Taurus, the Bull, one of the twelve signs of the zodiac, which the sun enters about the 20th April. Taurus is also the second zodiacal constellation, containing, according to the British catalogue, 141 stars. Several of these are remarkable, as Aldebaran, of the first magnitude, in the eye; the Hyades, in the face; and the Pleiades, in the neck.

Taurus, a mountain chain in Asiatic Turkey, stretching for about 500 miles from the Euphrates to the Aegean Sea, latterly running north of the Gulf of Adalia. In the east it takes the name of Ala Dag, in the west that of Bulghar Dag. It descends steeply to the sea on the south; northwards it merges gradually into the plateau of Asia Minor. It is connected by the Alma-Dagh with the chain of Lebanon; and by Anti-Taurus, with Ararat, Ellburz, and the Caucasus.

Tautog, a fish (*Tautoga nigra* or *ameri-*

cana) found on the coast of New England, and valued for food. See *Blackfish*.

Tavernier, JEAN BAPTISTE, Baron d'Aubonne, the son of a Dutch merchant settled in Paris, was born at Paris about 1605, and died at Moscow in 1689. Before his twenty-first year he had visited a considerable portion of Europe, and he repeatedly travelled through Turkey, Persia, India, and other eastern countries, trading as a diamond merchant. In 1669, having realized a large fortune, and obtained a patent of nobility from the French king, he retired to his estate of Aubonne, in the Genevese territories. He compiled, with the aid of French littérateurs, *Nouvelle Relation de l'Intérieur du Serail du Grand Seigneur, Six Voyages, and Recueil de Plusieurs Relations*, which have been often reprinted and translated.

Tavi'ra, a seaport of Portugal, province of Algarve, on the Rio Sequa. The town is well built and has a considerable trade especially connected with the sardine fisheries. Pop. 12,178.

Tavistock, a market-town, England, county of Devon, in the valley of the Tav, 16 miles north of Plymouth. It has a guild-hall, grammar school, &c., and some remains of a once magnificent abbey. Copper, tin, arsenic, &c., are found. It was formerly a parliamentary borough, and now gives name to a parl. div. Sir Francis Drake was a native, and the town possesses a colossal statue of him. Pop. 4728.

Tavoy, a district in the Tenasserim division of Lower Burmah; area, 5300 square miles. The country is mountainous with thick forests and jungle, and the chief rivers are the Tavoy and the Tenasserim. Pop. 109,000. The chief town and the headquarters of the deputy-commissioner is Tavoy, situated about 30 miles from the mouth of the river of the same name. Pop. 22,000.—There is also an Island of Tavoy, the largest and most northern of the extensive chain which fronts the Tenasserim coast. It is about 18 miles long and 2 broad, and on the eastern side there is a well-sheltered harbour called Port Owen.

Tawing, the manufacture of sheep, lamb, and goat skins into white leather. See *Tanning*.

Tax, a contribution levied by authority from people to defray the expenses of government or other public services. A tax may be a charge made by the national or state rulers on the incomes or property of individuals, or on the products consumed by

them. A tax is said to be *direct* when it is demanded from the very persons who it is intended or desired should pay it, as, for example, a poll-tax, a land or property-tax, an income-tax, taxes for keeping man-servants, carriages, dogs, and the like. It is said to be *indirect* when it is demanded from one person in the expectation and intention that he shall indemnify himself at the expense of another; as, for example, the taxes called customs, which are imposed on certain classes of imported goods, and those called excise duties, which are imposed on home manufactures or inland production. Taxes are also rates or sums imposed on individuals or their property for municipal, county, or other local purposes, such as police taxes, taxes for the support of the poor (poor-rates), taxes for the repair of roads and bridges, &c. In Great Britain and elsewhere house taxes or taxes on rental form the largest part of the local revenues, municipal revenues being, indeed, entirely raised from this source. Adam Smith has laid down four principles of taxation, which have been generally accepted by political economists. These are: (1) The subjects of every state ought to contribute to the support of the government as nearly as possible in proportion to their respective abilities. (2) The tax ought to be certain, not arbitrary. (3) Every tax ought to be levied at the time or in the manner most convenient for the contributor. (4) Every tax ought to be so contrived as both to take out and keep out of the pockets of the people as little as possible over and above what it brings into the public treasury of the state. See also *Income-tax, Customs, Excise, &c.*

Taxaceæ, a sub-order of Coniferæ, sometimes regarded as a distinct order, comprising the yew-tree (*Taxus*) and other trees or shrubs which inhabit chiefly the temperate parts of Europe, Asia, Africa, and America.

Taxel, the North American badger (*Meles labradorica*). Its teeth are of a more carnivorous character than those of the true badger, and it preys on such small animals as marmots. Its burrowing powers are remarkable, its hole running underground to a length of 30 feet.

Taxidermy, the art of preparing and preserving the skins of animals, and also of stuffing and mounting.

Taxodium, a genus of plants, natural order Coniferæ. The *T. distichum*, or deciduous cypress, a common ornamental tree upon English lawns, is a native of North

America. The bark exudes a resin which is used by the negroes for dressing wounds, and



Taxodium distichum.

the roots, which are hollow inside, are used for bee-hives.

Tay, the longest river in Scotland, and the one that carries to the sea a greater volume of water than any other in the British islands. It rises on the north side of Ben Lui, near the borders of Argyleshire and Perthshire; is known in its earliest course as the Fillan, and enters Loch Tay, after being joined by the Lochy, as the Dochart; issues thence as the River Tay, and receives in its course the Lyon, Tummel, Garry, Isla, Bran, Earn, Almond, &c., passes the towns of Aberfeldy, Dunkeld, and Perth; and at the latter place widens out into the Firth of Tay, and finally enters the North Sea. Its length is about 120 miles, its greatest breadth in the estuary $3\frac{1}{2}$ miles, and the area drained 2400 square miles. It is navigable as far as Perth, but Dundee is the chief port. The salmon fisheries are important.

Tay, Loch, a loch of Scotland, in the county of Perth, 15 miles long and about 1 mile broad; receiving at its south-west end the Lochy and the Dochart, and discharging at its north-east end at Kenmore by the Tay. It is 100 to 600 feet deep, and is well supplied with fish. On its north-west shore rises Ben Lawers.

Tay Bridge, a great railway bridge in Scotland crossing the estuary of the Tay from Fifeshire to Forfarshire at Dundee. The first bridge built here was opened for traffic in 1878. It was nearly 2 miles long, and had 84 spans, 13 of which were blown down during the passage of a passenger train in a violent storm on the 28th Dec.

1879. Instead of repairing the bridge it was resolved to erect a new and more substantial one, and of the first all but the foundations has been removed. The present bridge is 2 miles 73 yards long, contains 85 piers, carries a double line of rails on a steel floor, and has an average height, above high-water, of 77 feet under four of the spans in the navigable channel. The piers are formed of cylinders embedded in the river bottom, and filled with concrete, while the superstructure is made of brick-work and malleable iron, braced by various stays and arches. The bridge was opened in June 1887.

Taygetus (ta-ig'e-tus), a mountain range of Southern Greece (the Morea). See *Greece*.

Taylor, BAYARD, American writer and traveller, born at Kennett Square, Pennsylvania, in 1825, died in 1878. He learned the trade of a printer, contributed to various magazines, made a journey through Europe on foot in 1844-45, on his return published *Views Afoot in Europe*, and in this way gained a position on the staff of the N. Y. Tribune. He afterwards travelled extensively, giving his experiences in *Eldorado* (1850); *Central Africa* (1854); *The Lands of the Saracens* (1854); *Visit to India, China, and Japan* (1855); *Northern Travel* (1855); *Crete and Russia* (1859); *Byways of Europe* (1869); and *Egypt and Iceland* (1874). He also published several novels; various volumes of verse, such as *Rhymes of Travel* (1848); *A Book of Romances, Lyrics, and Songs* (1851); *Poems and Ballads* (1854); *Poems of the Orient* (1855); *The Masque of the Gods* (1872); and a translation of Goethe's *Faust* in the original metres. He resided in Germany for lengthened periods, was for some time United States secretary of legation at St. Petersburg, and latterly he was U.S. ambassador at Berlin, where he died.

Taylor, BROOK, an English mathematician, born at Edmonton in 1685, was educated at Cambridge, and died in 1731. Chosen a fellow of the Royal Society, he became its secretary in 1714, an office which he retained four years. His chief works are: *Methodus Incrementorum Directa et Inversa* (London, 1715), and *Linear Perspective* (London, 1715). He was discoverer of the mathematical formula called *Taylor's Theorem*, of extensive application in the higher mathematics.

Taylor, SIR HENRY, English writer, born

in 1800, died in 1886. At the age of fourteen he entered the navy; afterwards he became a clerk in the storekeeper-general's office; contributed to various periodicals, and undertook the editorship of the *London Magazine*, but soon afterwards accepted an appointment in the colonial office, where he remained for nearly fifty years. His contributions to literature are: *Isaac Comenanus*, a tragedy (1827); *Philip van Artevelde*, a dramatic romance (1834); *The Statesman*, a series of essays (1836); *Edwin the Fair*, historical drama (1842); *The Eve of the Conquest*, and other poems (1845); *Notes from Life* (1847); *Notes from Books* (1849); *The Virgin Widow*, a comedy, afterwards named *A Sicilian Summer* (1850); and *St. Clement's Eve*, romantic drama (1862). He published an *Autobiography* in 1885.

Taylor, ISAAC, a voluminous writer, born at Lavenham, Suffolk, 1786; died at Stan-ford Rivers, 1865. His life was passed without any noteworthy incident, and his published works include: *Elements of Thought* (London, 1823), *The Natural History of Enthusiasm* (1829), *The Natural History of Fanaticism* (1833), *Spiritual Despotism* (1835), *Physical Theory of Another Life* (1836), *Ancient Christianity* (1839-43), *Loyola and Jesuitism* (1849), *Wesley and Methodism* (1851), *Restoration of Belief* (1855), *World of Mind* (1857), *Ultimate Civilization* (1860), and *Spirit of Hebrew Poetry* (1861).—His sister, JANE TAYLOR (1783-1824), published *Display*, a tale (1814); *Contributions of Q. Q.*, a series of essays; and, in conjunction with her sister ANN, *Original Poems and Hymns for Infant Minds*.—His son, ISAAC TAYLOR, canon of York, was born in 1829, and graduated as a wrangler at Trinity College, Cambridge, in 1853. He is the author of *Words and Places* (1864); *Etruscan Researches* (1874); *Greeks and Goths* (1879); *The Alphabet*, an Account of the Origin and Development of Letters (1883); *Origin of the Aryans* (1889), &c. He died in 1901.

Taylor, JEREMY, one of the greatest names in the Church of England, was born in 1613 at Cambridge; died at Lisburne, Ireland, in 1667. He was educated at Perse's Free School in his native place; entered, in 1626, as a sizar in Caius College, where he graduated Master of Arts; and in 1636 obtained by the patronage of Archbishop Laud a fellowship of All Souls College, Oxford. In 1638 he was presented by Bishop Juxon to the rectory of Uppingham, in Rutlandshire,

TAYLOR.

and in 1642 he was appointed chaplain in ordinary to Charles I. After the outbreak of the civil war he continued to attend Charles as chaplain, and when the parliamentary party proved victorious he was frequently imprisoned for short periods. Eventually he retired into Wales, where he was received by the Earl of Carbery, under whose protection



Jeremy Taylor.

he was allowed to exercise his ministry and keep a school. Afterwards he removed to London, but in 1653 he accepted an invitation from Lord Conway to reside at his seat in Ireland. Here he remained until the Restoration, when he was elevated to the Irish see of Down and Connor, with the administration of that of Dromore. He was also, in the same year, made a privy-councillor for Ireland, and chosen vice-chancellor of the University of Dublin. The greater part of his writings consist of sermons and devotional pieces, and upon the former rests his fame as a master of varied English prose.

Taylor, JOHN, usually called the *water-poet*, was born in Gloucester about 1580, and died in 1654. He served an apprenticeship to a waterman, was at the taking of Cadiz, under the Earl of Essex, in 1596, and was many years collector of the wine dues exacted by the lieutenant of the Tower of London. He afterwards kept a tavern, first at Oxford and then at Westminster. His pieces to the number of sixty-three were published in a folio volume in 1630, but he was the author of a great many more both in prose and verse. They are characterized by a certain rough vigour not free from vulgarity.

Taylor, PHILIP MEADOWS, born at Liverpool 1808, died 1876. From being a merchant's clerk in Bombay he entered the Nizam's army; received an appointment as administrator of the state of Shorapore; maintained order in the Berar district during the mutiny of 1857; and received the rank of colonel, a companionship of the Star of India, and a commissionership of the Western Deccan districts. He published the *Confessions of a Thug* (1839), *Tippoo Suldaun* (1840), *Tara* (1863), *Ralph Darnell* (1865), *Manual of the History of India* (1870), and *A Noble Queen* (1878).

Taylor, THOMAS, the 'Platonist,' born in London 1758, died at Walworth 1835. He studied with a view to the dissenting ministry, but entered a banking-house, when all his leisure was devoted to classical and philosophical studies. He published, chiefly with the aid of patrons, about forty different works, the most remarkable of which are *Plato* (five vols. 4to, 1804), printed at the expense of the Duke of Norfolk, who kept almost the whole edition locked up till 1848; and *Aristotle* (ten vols. 1806-12), printed at the expense of Mr. W. Meredith, who gave Taylor an annuity of £100, which he enjoyed till his death.

Taylor, TOM, born at Sunderland in 1817, died 1880. He received his education at Glasgow University and Trinity College, Cambridge; became professor for two years in University College, London; was called to the bar (1845), and went on the northern circuit; appointed, in 1854, secretary to the Board of Health; wrote and adapted for the stage a great number of plays; and succeeded Shirley Brooks (1873) as editor of *Punch*. The most popular of his plays are: *New Men and Old Acres*, *Masks and Faces* (in collaboration with Charles Reade), *Still Waters Run Deep*, *The Overland Route*, and *The Ticket of Leave Man*. His historic dramas include: *The Fool's Revenge*, *Joan of Arc*, *Twixt Axe and Crown*, *Lady Clancarty*, *Anne Boleyn*, &c. He also published biographies of B. R. Haydon (1853), C. R. Leslie (1859), and Sir Joshua Reynolds (1865).

Taylor, WILLIAM, born at Norwich in 1765, died 1836. He was educated for a mercantile career, but after a lengthened stay in Germany he resolved to devote himself to literature. His published works are: a translation of *Bürger's Lenore* (1796) and *Lessing's Nathan the Wise* (1805), *English Synonyms Discriminated* (1813),

and a Historic Survey of German Poetry (1828).

Taylor, ZACHARY, twelfth president of the United States, born in Orange county, Virginia, 1784; died 1850. He entered the army in 1808, and rose to the rank of major; took command of the United States forces at the outbreak of the Mexican war; repeatedly defeated the Mexicans, and finally triumphed over Santa Anna in the battle of Buena Vista (1847). Having returned to the United States, his popularity caused him to be elected president; but 'Old-rough-and-ready,' as he was called, only held this position for a few months.

Taylor Institution, an institution in connection with Oxford University, designed mainly for the promotion of the study of modern European languages. It owes its foundation to a bequest of Sir Robert Taylor, and the building belonging to it was erected in 1848.

Tayra (*Galera barbura*), a carnivorous animal allied to the glutton, found in South America. In colour it is black, save a large white patch on the breast.

Tchad, CHAD, or TSAD, a large freshwater lake of Central Africa, in the Soudan, surrounded by the French Soudan, N. Nigeria (British), the German Cameroon territory, and French Congo; area, formerly estimated at 20,000 sq. miles, now at 7000, with a variable expanse according as it is the wet or dry season. Its principal feeder is the Shari from the south, and its shores are low and marshy. The lake (which has no outlet) swarms with turtles, fish, crocodiles, and hippopotami. It contains a number of small islands, which are densely peopled, as are also great part of its shores, especially on the south-west, where is the large town Kuka.

Tchelyabinsk, a town of Russia, gov. of Orenburg, on the Miyass, a centre of trade and industry. Pop. 20,000.

Tcherkask, or OLD TCHERKASK, a small town of South Russia. See *Novo-Tcherkask*.

Tcherkassy, a town, government of Kieff, Russia, situated on the Dnieper, 190 miles south-east of Kieff. It is built of wood, and has a considerable trade. Pop. 29,620.

Tchernigov, TCHERNIGOFF, or TCHERNIGOW, a government of Little Russia, situated on the left bank of the Dnieper; area, 20,232 sq. miles. The country is chiefly an undulating plain, fertile for the most part, and watered by the Soj, the Desna, and the Dnieper. Agriculture and cattle-breeding are the chief employments;

corn, linseed, timber, tobacco, and sugar are exported. Pop. 2,297,800. — **TCHERNIGOV**, the capital, is situated on the Desna, about 80 miles N.N.E. of Kieff. It is the see of an archbishop, has a cathedral, a college, hospital, &c., and a considerable trade. Pop. 27,028.

Tchern'ozem, the name for a black soil in Russia of extraordinary fertility, covering at least 100,000,000 acres, from the Carpathians to the Ural Mountains, to the depth of from 4 to 20 feet, and yielding an almost unlimited succession of similar crops without preparation.

Tcherny. See *Czerny*.

Tchudes, a name applied by the Russians to the Finnic races in the north-west of Russia. It has now acquired a more general application, and is used to designate the group of peoples of which the Finns, the Estonians, the Livonians, and Laplanders are members.

Tea (*Thea*), a genus of plants, natural order Ternstroemiaceæ (that to which the camellia belongs), comprising the species (*T. sinensis* or *chinensis*) which yields most of the tea of commerce. By different modes of culture this species has diverged into two distinct varieties, entitled *Thea viridis* and *Thea bohea*. The former is a large hardy evergreen plant with spreading branches and thin leaves from 3 to 5 inches long; the latter is a smaller plant, and differs from the other in several particulars. From both, according to the process of manufacture, black and green teas are procured. The tea plant is not only cultivated over a great part of China, but also in Japan, Tonquin, Cochinchina, Assam and other parts of India, and Ceylon. It has also been introduced into the U. States, Brazil, South Africa, and Australia. Its growth is chiefly confined to hilly tracts; it is raised from seed, and the rearing of it requires great skill and attention. In seven years the plant attains the height of 6 feet, and the leaves are plucked off carefully one by one four times a year. In their green condition they are placed in a hot pan over a small furnace, and then rubbed lightly between the palms of the hands, or on a table. This process is repeated until the leaves become small, crisp, and curled. The black teas thus prepared include bohea, congou, souchong, and pekoe; the green teas, twankay, hyson-skin, young hyson, hyson, imperial, and gunpowder. Green tea gets less of the fire than black tea. The broken leaves,

stalks, and refuse of the tea are compressed into solid bricks, and in this form it is imported by the Russians into the greater part of Central Asia, where (besides being used as a sort of coinage) it is sometimes stewed with milk, salt, and butter. There is considerable adulteration in the teas sent from China to the European market, and they are often artificially coloured with a mixture of Prussian blue, or of gypsum and indigo carefully mixed. The infusion of tea-leaves in hot water yields a beverage which has little nutritive value, but it increases respiratory action, and seems to have a stimulative and restorative action on the nervous system. This is chiefly due to the essential oil and the theine (an alkaloid in its nature identical with the caffeine in coffee) which it contains, whilst the tannin, which is also present, acts as an astringent. If the water is boiling an infusion of ten minutes is sufficient to extract all the theine, and a longer period only adds to the tannin in the beverage, a result which is very hurtful to digestion. From historical sources we learn that tea was used in China as a beverage in the 6th century, and two centuries after its use had become common. In England we first find it mentioned about 1615 by an agent of the East India Company; in 1660 Pepys says in his diary, 'I did send for a cup of tea, a China drink, of which I never had drunk before;' and in 1664 the East India Company made a present to the king of 2 lbs. 2 oz. In the year 1678 the import of tea to Britain was 5000 lbs.; forty years after it reached 1,000,000 lbs.; and in 1905 the total import was 308,408,903 lbs., the rate of consumption being nearly 6 lbs. per head of the population. China used to hold almost a monopoly in the production of tea, but first India and then Ceylon (after 1873) became important competitors, and now some nineteen-twentieths of all the tea brought to Britain is the produce of these countries, Ceylon in particular having recently made extraordinary advances in the quantity of its tea produced. Britain is the principal tea-consuming country in the world, coffee being less in favour there than in many other countries, the U. States and Canada for example. The import of tea to the U. States is less than half that of Britain. In 1906-07 the tea duty yielded to Britain a revenue of £5,588,288.

Teak (*Tectona grandis*), a tree of the nat. order Verbenaceæ, a native of different parts of India, as well as of Burmah and of the

islands from Ceylon to the Moluccas. It grows to an immense size, and is remarkable for its large leaves, which are from 12 to 24 inches long, and from 6 to 18 broad. The wood, though porous, is strong and durable;



Teak (*Tectona grandis*).

it is easily seasoned and shrinks but little, and from containing a resinous oil it resists the action of water, and repels the attacks of insects of all kinds. It is extensively used in ship-building and for many other purposes.—*African teak*, a timber similar to East Indian teak, is believed to be the produce of *Oldfieldia africana*, nat. order Euphorbiaceæ.

Teal, the common name for ducks of the genus *Querquedula*, the smallest and most beautiful of the Anatidæ, or duck family. The common teal (*Q. crecca*) makes its appearance in England about the end of September and remains till spring, but in many parts of Scotland it remains all the year. Its length is about 14 inches. The green-winged teal (*Q. carolinensis*) is very like the common teal. The blue-winged teal (*Q. discors*) is somewhat larger than the common teal, and is easily domesticated. Both are North American.

Teasel, the English name of several plants of the genus *Dipsacus*, nat. order Dipsacæ, allied to the composite order. One species (*D. sylvestris*) grows wild in England, being a strong prickly plant 4 to 6 feet high. Another species, the fuller's teasel (*D. ful-lonum*), by some regarded as a mere variety, is cultivated for the sake of the awns of the head, which are employed to raise the nap of woollen cloths. For this purpose the heads are fixed round the circumference of a large wheel, which is made to turn round while the cloth is held against the brush thus formed,

and the fine hooked awn of the teasel draws out with it some of the fine fibres of the wool. These are then shorn smooth, and leave the cloth with a fine velvety nap.

Technical Education, a term commonly restricted to instruction that has a bearing on industrial and commercial life, and is specially intended for pupils who contemplate entering on such a life. It embraces engineering in its several branches—civil, mechanical, electrical, mining, and sanitary—textile fabrication, chemical technology, building and architecture, industrial art, commerce, &c. The recent demand for such instruction has arisen chiefly because, by the modern use of machinery and a highly-developed division of labour, the old apprentice system has broken down, and workmen have ceased to learn all the details of their crafts, becoming little more than human tools employed in some one small department; while in a workshop underlying principles are only illustrated, not explained. Technical education in its rudiments may begin in the kindergarten system, and in the system of manual training by which, often in connection with elementary education, pupils acquire a certain dexterity in using hand-tools. In its more advanced forms special schools are required, and, as instituted in different countries, three grades of these exist: (1) schools intended for apprentices, workmen, artisans, clerks; (2) secondary schools for the more intelligent artisans, foremen, overseers, &c.; (3) technical high-schools or universities for those who may be called upon to fill the highest positions, such as managers, directors, proprietors, designers, architects, &c. The need for special technical education was first most fully recognized in Germany. In England it was seen that as other nations had begun to foster a system of technical instruction this would render industrial competition still more keen. Hence the City and Guilds of London Institute was originated in 1878, and the connected Central Technical College at South Kensington, built at a cost of £100,000, was started in 1884. It is a college for higher technical instruction, while the City and Guilds Technical College, Finsbury, forms an intermediate college. In the South London School of Technical Art, again, are taught modelling, drawing and painting, house decoration, &c. Recently a number of technical institutes, polytechnics, schools of art, &c., have been established

in London, many of them maintained by the County Council. The Technical Instruction Act of 1889 enabled local authorities to levy a rate for the furtherance of technical education; and by an act of 1890 the proceeds of a new tax on spirits were made available for the same purpose. Technical instruction may also be supported out of school funds, greater power having been given to local authorities under the Education Act of 1902. In Scotland technical education may be given in the ordinary schools; and two or more school-boards may combine to provide a technical school for a common district. Technical education is now making rapid advances, and a number of technical institutes and colleges have been recently established in the large towns, such as Manchester, Bradford, Derby, Glasgow, &c.

Technology, the science or systematic knowledge of the industrial arts, as spinning, weaving, dyeing, metallurgy, brewing, and the like.

Teco'ma, a genus of plants, nat. order Bignoniaceæ—trees or shrubs or climbing plants, with unequally pinnate or digitate simple leaves, and terminal panicles of dusky red or orange flowers. They are natives of tropical and sub-tropical climates, and some, as *T. impetiginosa*, are medicinal.

Tectibranchia'ta, a division of gastropodous mollusca, comprehending those in which the gills are protected by a shell, or by the mantle, such as the sea-hare.

Teddington, town of England, county of Middlesex, on the Thames, at the farthest tidal limit, about 13 miles south-west of London. It has a fine parish church, and the largest lock on the Thames. Pop. 14,037.

Te Deum, a name (from the opening phrase *Te Deum laudamus*) of the well-known Latin hymn usually ascribed to St. Ambrose and St. Augustine, although it cannot be traced farther back than the end of the 5th century. It is used in the ritual of the Roman Catholic and Anglican churches, being part of the morning service in the latter ('We praise thee, O God,' &c.).

Teel, **TEEL-SEED**, a name for *Sesamum indicum* and its seed. See *Sesamum*.

Tees, a river in England, which rises near Cross Fell, in Cumberland, and flowing south-east, and latterly north-east, marks the southern limit of the county of Durham, to its mouth in the North Sea, where it forms an estuary, passing Stockton and Middlesbrough. Length, 70–80 miles.

TEETH — TEHUANTEPEC.

Teeth, the name given to certain hard structures growing out of the jaws of vertebrate animals, and serving as the instruments of mastication. The teeth of animals differ in shape, being destined for different offices. In man and the higher mammals two sets of teeth are developed, the early, milk, or deciduous teeth, and the permanent set. In fishes the teeth fall off and are renewed repeatedly in the course of their lives. Teeth do not belong to the skeleton, but to the skin or exoskeletal parts of the body, and are homologous with hairs. In man the teeth are imbedded in sockets in the upper and lower jaw-bones. There are thirty-two in all, sixteen in each jaw, and each consists of the crown or visible part, and the fangs or buried part. The four central teeth of each jaw having chisel-shaped crowns with sharp edges are called incisors; on each side of these four is the pointed canine tooth (which in the upper jaw are called the eye-teeth); on each side of these are two bicuspid teeth (præmolars); and behind these again are the molar teeth, three on each side. (See *Dental Formula*.) The last of the permanent teeth to appear are the farthest back grinding teeth, which, owing to their arrival between the seventeenth and twenty-fifth years, are called the wisdom teeth. Each tooth has a central cavity filled with a soft pulp containing blood-vessels and nerves; this cavity is surrounded by dentine, a hard substance composed of phosphate and carbonate of lime; outside the fang is a cement-like substance resembling bone; while outside the crown is a hard enamel. In young teeth the enamel is covered by a delicate membrane called 'the skin of the teeth,' which in adult teeth is worn off. Toothache is due to decay of the substance of a tooth, dental caries as it is called. When the enamel which covers the tooth becomes flawed the underlying dentine is exposed and soon breaks down. When the decay, passing inward, reaches the pulp which contains the blood-vessels and nerves it causes inflammation, aching, and suppuration. Any treatment of toothache, short of extraction, is seldom satisfactory if the pulp has been actually attacked; but neuralgia is often mistaken for toothache. See *Dentistry*.

Teetotalism. See *Temperance*.

Teff (*Eragrostis abyssinica*), a grain extensively cultivated in Abyssinia, having seeds about the size of those of millet.

Tegnér (teng'när), ESAIAS, Swedish poet,

born in 1782, studied at the University of Lund, became in 1812 professor of Greek literature, and in 1824 was appointed bishop of Wexjö, where he died in 1846. Among his works may be mentioned his *Frithiofs Saga*, an epic poem, repeatedly translated into English; his national song of the *Gotha Lion*; and *The Children of the Lord's Supper*, translated by Longfellow.

Tegucigalpa, the capital of Honduras, on the Río Grande, about 3370 feet above the sea, surrounded by mountains, with a venerable old church, a high school, and an active trade. Pop. 15,000.

Teguexin (te-gek'sin; *Teius Teguxin*), a species of lizard inhabiting tropical America. A full-grown specimen may exceed 5 feet in length, and they are able to swim with great ease and rapidity.

Teheran, capital of Persia, in prov. Irak Ajemi, about 70 miles south of the Caspian Sea, at the southern base of Mount Elburz, surrounded by gardens and cultivation. It is (since 1871) defended by an earthen rampart fully 9 miles long, with a broad dry ditch outside, and has twelve gates, with stone bridges crossing the ditch. The main streets lead to the bazaar in the centre, and there are various squares or open spaces. The city has latterly been much improved, the chief streets being lighted with gas and laid with tramways. The principal edifice is the citadel-palace of the shah, but the city is not rich in buildings. There are numerous mosques, a high school or college, &c. During the hotter months the court removes to the heights on the north, and a third of the inhabitants (including the European embassies) follow. The principal manufactures are carpets, silks, cottons, and hardware; there is a large caravan trade. Pop. (in winter), 210,000.

Tehri (tā-rē), a state of Hindustan. See *Garhwāl*. TEHRI is also a name for the state of Orchha (which see), and for its capital, an ill-built town with a pop. of 18,000.

Tehuacan (tā-wā-kán'), a town in the state of Puebla, Mexico, at the southern extremity of the highlands of Anahuac, on the right bank of the Salado. Pop. 7159.

Tehuantepec (tā-wān-te-pek'), a town of Mexico, state of Oaxaca, 14 miles above the mouth of a river of same name, falling into the Pacific Ocean. Pop. 10,386. The town is near the south side of the ISTHMUS OF TEHUANTEPEC, the narrowest part of N. America, having the GULF OF TEHUANTEPEC on the Pacific side, the Bay of Cam-

peachy on the Atlantic side; width, about 125 miles. There have been various schemes for constructing a canal or a ship railway across the isthmus, which at its lowest point is 690 feet high. One scheme of the latter sort was that of an American engineer named Eads, who died in 1887. (See *Ship Railway*.) An ordinary railway from Coatza-coalcos or Puerto Mexico, on the Gulf of Mexico, to Salina Cruz, on the Pacific, has been opened, good harbour accommodation being provided at both ends, and practically completed in 1906. This route is expected to attract a great amount of traffic and compete with that by Panamá, over which it is claimed to possess certain advantages.

Teignmouth (tân'muth), a seaport, watering-place, and market-town of England, in the county of Devon, at the mouth of the Teign, which forms a tidal estuary, and is crossed by a wooden bridge 1671 feet in length. It used to be divided into East Teignmouth and West Teignmouth, but the two with modern quarters now form a single town. Teignmouth is much frequented as a seaside resort, and there is a pleasure pier, with a promenade. The fisheries employ a number of the inhabitants. Pop. 8636.

Teinds (tênds), the Scotch law term for tenths or tithes of the fruits of the land. In the majority of instances the teinds now belong to the owners of the land formerly paying them, to the crown, or other proprietors, they being charged in all cases with the payment of the parish minister's stipend.

Telamon. See *Atlantes*.

Telan'tograph, a writing telegraph invented by Elisha Gray whereby a facsimile reproduction of the handwriting of the sender of the message is effected. It has recently been greatly improved and requires only two line wires. Sketches, &c., can be produced at the other end of the two lines. By the action of a set of small levers the pen at the receiving end follows exactly the movements of the pen at the sending end, rises from the paper when the sending pen is lifted, and dips into the ink when the sending pen does so.

Telédn, a Javanese carnivorous quadruped (*Mydous meliceps*), family Mustelidæ, allied to the skunk, and, like it, capable of diffusing a most abominable stench.

Telegraph, a general name for any instrument or apparatus for rapidly conveying intelligence beyond the limits of distance at which the voice is audible. Thus the word covers (1) the apparatus on the

bridge and in the engine-room of steamships for giving instructions regarding speed and direction of the engines; (2) flag-signalling used by the army and navy; (3) heliograph used by the army; (4) semaphore used by the navy on ships and at coast stations; (5) the electric telegraph. It was to a kind of semaphore apparatus that the name was first given.

In the steam-ship telegraph there are two dials exactly similar, one on the bridge, the other in the engine-room. They are so connected that when the handle of the instrument on the bridge is placed at a particular order, the pointer in the engine-room points to the same order, and in its movement to that position it sounds a gong to attract the engineer's attention. One mode of flag-signalling requires two flags, and employs the semaphore alphabet code, in which each letter is represented by a definite fixed position of the flags; in the other mode, one flag is used, and given short or long movements to correspond with the dots and dashes of the Morse code (see below). The semaphore consists of two long arms mounted on pivots at the top of a pole; each arm is connected with a handle near the base, and the two follow exactly the movements of their respective handles. By varying the positions of the arms a complete alphabet is obtained. In the *heliograph* the sun's rays are utilized for signalling by reflection from a mirror. (See *Heliograph*.)

The *electric telegraph* is what is ordinarily understood by the word telegraph. It is of many types, but most of them are based on the property possessed by soft iron of being rapidly magnetized or demagnetized by the influence of the electric current. This magnetization is utilized to move certain levers by which the transmitted signals can be translated into the letters of the alphabet. The chief parts are: (a) a source of electricity, (b) a conductor or line wire, (c) the transmitting apparatus, and (d) the receiving apparatus.

The source of electricity may be a number of primary cells, such as those used for ringing electric bells; or a number of secondary cells, such as those used for driving motors or for electric lighting; or it may be a small magneto-electric machine or a dynamo. The line wire may be of galvanized iron, or copper, suspended on insulators mounted on poles; or it may be a continuously insulated wire, i.e. surrounded

TELEGRAPH.

for the whole of its length with a non-conducting covering, such as gutta-percha, india-rubber, or paper, the latter being protected from moisture by being hermetically sealed in a lead pipe. For protection from mechanical injury, underground wires are drawn into iron pipes or earthenware ducts.

The *needle telegraph* (see plate) was one of the earliest instruments. Its transmitting portion consists of a single lever in some cases, and of a double lever in others, by which a current can be sent to the line and through the apparatus at the other end, in either direction at will, or when the levers are at rest the instrument is in a condition to receive currents from line. The receiving portion consists of a bobbin of fine insulated wire surrounding a small strip of soft iron kept permanently magnetized by a steel magnet. The soft-iron strip is fixed to a light spindle which passes through the dial of the instrument and carries a blackened light brass pointer or needle whose movement is limited by two ivory pins at the upper end. The action of an incoming current is to deflect the soft iron, and with it the needle, either to the right or to the left, in accordance with the direction of the incoming current. The combinations of these movements are utilized to form letters in accordance with the Morse code, a movement to the left representing a dot, and to the right a dash.

The Wheatstone A B C instrument (see plate) is a magneto-electric telegraph, the current being generated by the turning of a handle. This current is first in one direction, then in the other, and only passes out to line when the pointer of the transmitting portion is moving. The pointer is stopped at any desired letter of the alphabet on the sending dial by the depression of the corresponding key. The receiving portion consists of another and very much lighter pointer which is rotated by a ratchet actuated by the incoming currents, which move it first in one direction, then in the other. The receiving dial has a set of letters in exactly the same order as those on the sending dial, so that, provided both pointers are started from the zero position, marked by a cross, the two pointers will always point to the same letters, and when the sending pointer is stopped at a particular letter, the receiving pointer also indicates that letter.

The Morse telegraph (fig. 1) gives short and long signals which are transmitted by

the depression of a lever, thereby connecting one pole of a battery to line, the other pole being connected to earth. The incoming currents pass through an electro-magnet, giving its armature a corresponding move-

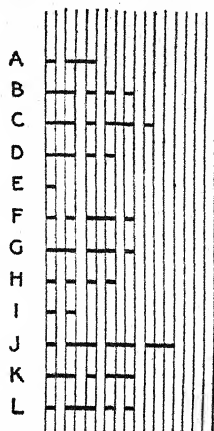


Fig. 1.—Part of Morse Alphabet.

ment to that of the lever at the sending end. The other end of the armature raises or lowers a revolving inking disc which, when the armature is depressed, imprints an ink mark on a moving paper band. The transmitted signals are thus recorded. The

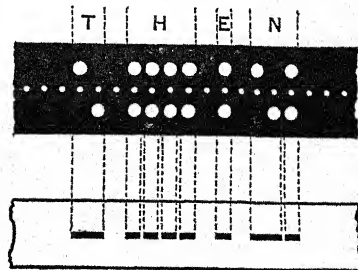


Fig. 2.—Word THEN, Punched and in Morse.

sounder (see plate) is practically the electrical portion of a Morse receiver. After some practice, one can learn to distinguish by the clicks of the lever whether the signals are short or long, and eventually to read Morse signals by sound.

The Wheatstone automatic or high-speed

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telegraph is a greatly improved Morse. The transmitting portion is very light, and is driven by gearing at a very high speed. The movement of the transmitting lever is controlled by a perforated paper tape whose holes correspond to Morse signals, a dot being represented by two holes in line with a central hole, whilst a dash is represented by two holes set obliquely (fig. 2). The receiver is a greatly improved Morse receiver, the signals being received in dots and dashes on the ordinary Morse paper band. The speed has reached 500 words a minute.

The Hughes instrument (see plate) is a printing telegraph, recording the received signals in Roman type on a paper band. It has twenty-eight keys similar to those of a piano, representing the letters of the alphabet, and two spacing keys. These keys control the type-wheel at the sending end, and at the same time can transmit currents to line. These currents in passing through an electro-magnet at the receiving end release certain levers, which cause a paper band to be lifted against the type-wheel at the correct moment to print the corresponding letter of the key that was depressed at the sending end. The Baudot telegraph is also a printing system, in which different combinations of five keys are used to represent the letters of the alphabet. The great utility of this system is that one line wire is used for the transmission of as many as eight messages at practically the same instant. It is one of what is known as the *multiplex* systems, and is largely mechanical.

The *syphon recorder* is used for working on long cables. The signals are transmitted by two levers on the same principle as the needle telegraph. The received currents pass through a suspended coil, to which a very light glass tube known as the syphon is attached. At one end it dips into an ink-well, whilst its other end just clears a paper band. When once the ink is properly through the syphon, the movement of the paper draws out the ink, whilst a further supply is drawn in at the other end. The signals are thus recorded in a wavy, unbroken line, and the movements to the right or left of the centre represent the dots and dashes of the Morse code.

As early as 1747 Bishop Watson showed that signals might be sent through a wire stretched across the Thames by discharging a Leyden-jar through it. Lessage in 1774

erected at Geneva a telegraph line consisting of twenty-four wires connected with the same number of pith-ball electroscopes, each representing a letter. Volta's discovery of the galvanic pile and Oersted's discovery of electro-magnetism afforded much greater facilities for transmitting signals to a distance. Ampère, in 1820, proposed to utilize Oersted's discovery by employing twenty-four needles to be deflected by currents sent through the same number of wires; and Baron Schilling exhibited in Russia, in 1832, a telegraph model in which the signals appear to have been given by the deflections of a single needle. Weber and Gauss carried out this plan in 1833 by leading two wires from the observatory of Göttingen to the Physical Cabinet, a distance of about 9000 feet. The signals consisted in small deflections of a bar-magnet suspended horizontally with a mirror attached, on the plan since adopted in Thomson's mirror galvanometer. At their request the subject was earnestly taken up by Professor Steinheil of Munich, whose inventions contributed more perhaps than those of any other single individual to render electric telegraphs commercially practicable. He was the first to ascertain that earth connections might be made to supersede the use of a return wire. He also invented a convenient telegraphic alphabet, in which, as in most of the codes since employed, the different letters of the alphabet are represented by different combinations of two elementary signals. His currents were magneto-electric, like those of Weber and Gauss. The attraction of a movable armature by an electro-magnet furnishes the means of signalling which is the foundation of Morse's telegraphic system. About the year 1837 electric telegraphs were first established as commercial speculations in three different countries. Steinheil's system was carried out at Munich, Morse's in America, and Wheatstone and Cooke's in England. The first telegraphs ever constructed for commercial use were laid down by Wheatstone and Cooke on the Great Western and London and Birmingham Railways. The wires, which were buried in the earth, were five in number, each acting on a separate needle. The single-needle and double-needle telegraphs of the same inventors have been more extensively used. In 1872 a method of sending simultaneously two messages in opposite directions on the same wire was introduced

TELEGRAPH CABLE — TELEPHONE.

(*duplex telegraphy*), and it was also discovered that two messages could be sent in the same direction (*duplex telegraphy*). The two plans being combined, formed the *quadruplex* system.

Wireless telegraphy in its practical applications has come into existence since 1888, when Hertz demonstrated the existence in the ether of the so-called 'Hertzian waves', produced by an oscillatory electric spark, and spreading out in all directions. Such wave-movements produced at the transmitting station and radiated through space can be detected at a distance, provided a sufficiently sensitive receiver or 'wave-detector' is employed. The receiving stations are provided with an aerial wire or wires in which the electric waves set up oscillations, which in turn affect an extremely delicate piece of apparatus known as a *coherer*. In practice, series of waves are transmitted on the Morse system, and are received on a Morse receiver, or are read as from a sounder by means of a telephone receiver. In connection with wireless telegraphy the name of Marconi is the most familiar.

Telegraph Cable. There are two kinds of telegraph cables—submarine (see *Submarine Cable*) and subterranean or underground cables. The latter is now generally made of a large number of copper wires insulated with paper and hermetically sealed in a lead tube, which is then drawn into an iron or earthenware pipe.

Telemachus (te-lem'a-kus), a son of Ulysses and Penelope, who is reputed to have gone through many adventures in search of his father after the close of the Trojan war. He is the hero of a French prose epic by Fénelon (1699).

Teleology, the science or doctrine of final causes; the doctrine which asserts that all things which exist were produced by an intelligent being for the end which they fulfil.

Teleostei, a large and important sub-class of the class fishes, distinguished primarily by the usually *bony* nature of the skeleton as compared with the cartilaginous skeletons of some other sub-classes. Almost all our common fishes are included in this order. See *Ichthyology*.

Telephone, an instrument for transmitting the human voice or other sounds by means of electricity to distances ranging

up to 1000 miles or more. One conducting wire similar to a telegraph wire is sufficient for short distances, but owing to external interferences which produce noises in the receiver, the general practice is to use two wires which are insulated from, but are twisted round, each other. The disturbances pass through the wires in opposite

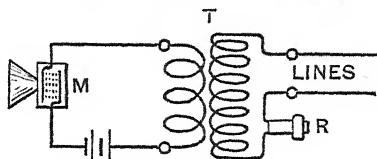


Fig. 1.—Principle of Telephone

directions, and in neutralizing each other have no effect upon the telephone.

The instrument consists of two principal parts, the microphone or transmitter M (fig. 1), the receiver R, placed at each end of the line or lines. The words to be transmitted are spoken in a moderate but distinct tone close against the funnel or mouthpiece of the transmitter, and are heard at the other end of the line by pressing the ear-piece of the receiver close against the ear. There are various forms of instruments, but the general principle is the same in every case.

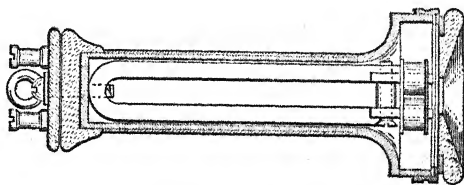


Fig. 2.—Double-pole "Bell" Receiver, in Section.

The transmitter is a part of a low-resistance electrical circuit formed by a battery of two cells, the primary or low-resistance coil of a small transformer T, and the microphone. The microphone or transmitter proper is formed of carbon granules placed between two conducting discs capable of vibrating (fig. 1, M). This arrangement has the peculiar property of changing its conductivity in accordance with the pressure applied. When vibrations, such as the sound-waves of speech, impinge on the disc of the microphone, the electrical conductivity is varied, and this varies the

strength of current in the transmitting circuit. The comparatively large variation of current is transmitted by the transformer coil to the line, and so to the distant receiver.

The receiver (fig. 2) consists of a permanent long horse-shoe magnet having two small electro-magnets containing many turns of fine wire, placed one on each pole. Close to these electro-magnets, but not touching them, is clamped a thin soft-iron disc. The effect of the incoming variable currents which pass through the coils of these electro-magnets is to slightly increase or decrease their magnetism, which in turn exerts a corresponding alteration in their attraction of the soft-iron disc. Hence the disc is subjected to a very minute vibration corresponding exactly to the vibrations that impinged on the disc of the microphone at the other end of the line. It is thus evident that these vibrations must produce similar sounds to, although many times weaker than, the originating sounds. In some forms of instruments the transmitter and receiver are combined to form one instrument, joined by a flexible cord to the main instrument. This type is very convenient for office tables, &c. In this form of instrument there is a small lever in the handle-piece to join up the speaking battery, and the lever must be kept continually depressed whilst speaking.

A calling device is provided on all instruments, as the speaking currents are far too weak to attract attention. It consists of a battery or magneto-electric machine which is joined to the line when calling; the currents on reaching the other end ring a bell.

In a telephone system of a town, means are provided at what is known as the *exchange*, for joining any one telephone line through to any other. This is done by joining the line wires to certain spring connections known as 'jacks', into which a plug joined to a flexible cord can be placed; at the other end of the flexible cord is another plug, which can be placed in any other 'jack', thus connecting any one instrument to any other instrument. Other apparatus, in the form of drop-indicators or small electric lamps, &c., are provided at the exchange to indicate to the operators when a subscriber is calling, and also when he has finished his conversation, so that the connecting cord can be removed. The whole instrument, with con-

nected apparatus, is known as a switch-board. (See Plate.)

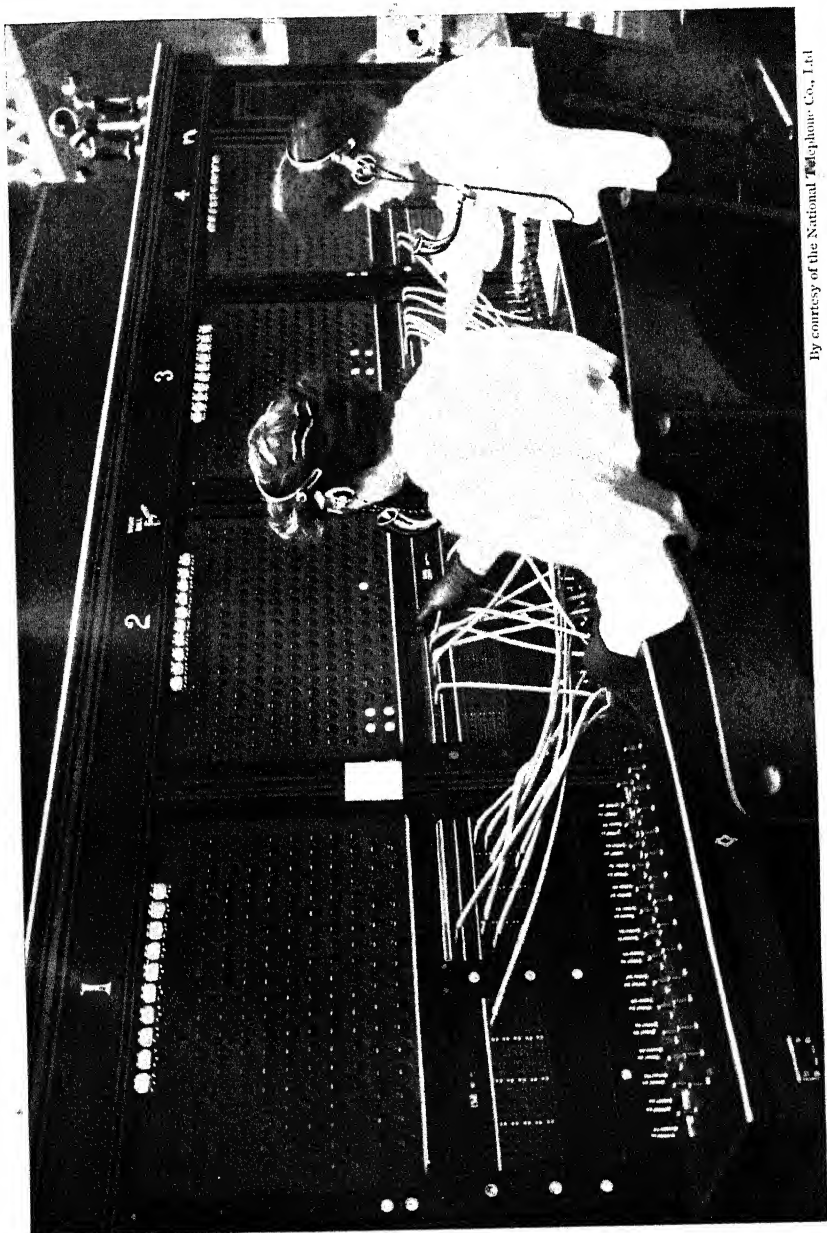
One town is connected to another by what are known as 'trunk' lines, which are thick copper lines; hence a person in one town is enabled to speak to one in another. It is possible for subscribers at many towns in England to speak to subscribers at many towns in France and Belgium by means of submarine cables of high conductivity specially constructed for submarine telephony. There are a variety of small house telephone sets which are very simple, effective, and cheap. They have no transformer coil, and are not liable to easily get out of order. They can be easily fitted to the electric-bell wires of a house or hotel, forming a very great convenience.

The telephone, although a comparatively recent invention, dating as a practical system from about 1876, and chiefly associated with the name of Graham Bell, has had a marvellous development, being now in use all over the world, on board ship, in mines, and on battle-fields. It is more handy and far cheaper than the telegraph, as the latter requires a skilled operator to send the message.

Telerpeton, an extinct genus of lizards, remains of which occur in sandstones of the New Red or Triassic period in Elginshire.

Telescope, an optical instrument essentially consisting of a set of lenses fixed in a tube or a number of sliding tubes, by which distant objects are brought within the range of distinct, or more distinct vision. The law of action by which the telescope assists human vision is twofold, and that under all the varieties of its construction. A distant object viewed by the unaided eye is placed in the circumference of a large circle, having the eye for its centre, and consequently the angle under which it is seen is measured by the minute portion of the circumference which it occupies. Now, when the distance is great, it is found that this angle is too small to convey to the retina any sensible impression—all the light proceeding from the object is too weak to affect the optic nerve. This limit to distinct vision results from the small aperture or pupil of the eye. The telescope substitutes its large object lens or reflector for the human eye, and consequently receives a quantity of light proportioned to its area or surface; hence a distant point, inappreciable by the eye alone, is rendered visible by the aid of the telescope. The rays of light, after transmission or reflection, converge to a point as they at

TELEPHONE



By courtesy of the National Telephone Co., Ltd.

COMMON BATTERY MULTIPLE SWITCH-BOARD, WITH OPERATORS AT WORK

TELEPHONE

The illustration shows a modern switch-board for a 'private branch exchange' such as is now being largely adopted in warehouses, public works, public institutions, &c. To this switch-board, which was fitted at a recent exhibition at Earl's Court, London, there can be connected 800 telephone lines. The board is divided into four sections, so that there are 200 subscribers' signals per section, each section being suited for one operator.

The apparatus is on the most modern system, known as the 'common battery'. By this system the batteries which formerly had to be placed beside every subscriber's telephone are dispensed with, the necessary current both for calling up the exchange and for speaking being supplied from a battery in the exchange which is 'common' to all subscribers.

The user calls the exchange by simply taking the receiver, or ear-piece, off its rest. Placing it to the ear he gives the number wanted, and in a few seconds, if his correspondent is prompt in replying, he hears the voice of the called subscriber. He never has to ring a bell, or do anything beyond listening and speaking. When *both* caller and called hang up their receivers the operator gets a double clearing signal and disconnects both lines. If only one hangs up the receiver, for the purpose of making some enquiry or other reason, the other can 'hold the line' by keeping his receiver to his ear.

The calling signals on this switch-board are discs worked as 'gravity drops'. When the subscriber takes his receiver from its rest a white disc appears and is held in sight by magnetic force until the operator answers. It then resumes the normal position by the action of gravity.

The necessary connections are made by means of so-called 'jacks', and plugs in which they are inserted. Below the calling signals are situated the exchange line jacks and the subscribers' jacks, so arranged that on each position the signals have jacks

to correspond, the latter thus becoming practically answering jacks. Each operator's key-board is fitted with fifteen pairs of plugs and cords, and a combined listening and ringing key to each pair. When the operator gets a call she inserts a plug into the subscriber's jack, and on ascertaining the number required inserts a plug into the corresponding jack, and gives notice to the called subscriber by means of the ringing plug, so that conversation may take place.

~ The use of such a system as that served by the switch-board shown is twofold:—

1. All departments in premises so equipped can speak to one another through the medium of this private branch exchange.
2. They can also call for and be called by all the subscribers to the public telephone system in that or any other town which has a telephone system.

TELESCOPE.

first proceeded from a point, and thus an image of the object is formed which, when viewed by the eye-piece or lens, is more or less magnified. The telescope therefore assists the eye in these two ways: it gathers up additional light, and it magnifies the object; that is to say, its image. The *refracting telescope* is constructed of lenses alone, which, by successive refractions, produce the desired effect. This instrument was formerly very cumbersome and inconvenient, inasmuch as its length had to be increased considerably with every accession of power; but the substitution of achromatic for ordinary lenses has rendered it more portable and convenient. The *reflecting telescope* is composed of specula or concave reflectors (see *Speculum*) aided by a refracting eye-piece. To this instrument we owe some of the most wondrous discoveries in astronomical science. The names of Newton, Gregory, Herschel, and Lord Rosse are connected with its history. The following diagrams exhibit the principles of construction and action in both

and field-glasses. Fig. 2 shows the structure of the reflecting telescope as constructed by Dr. Gregory. A B is a large speculum perforated in the centre; upon this fall

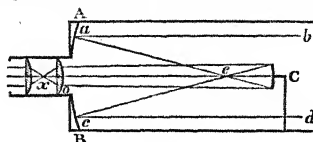


Fig. 2.

the rays *b*, *a* and *d*, *c*, which are reflected to convergence at *c*. A smaller speculum, *c*, takes up the diverging rays and reflects them, slightly converging, through the aperture *o*, where they are received by a lens, and, after transmission, they intersect at *r*, and proceed to the eye-glass, whence they emerge parallel. The magnifying power of this instrument is great for its length, being as $\frac{o \cdot e}{c \cdot C} \times \frac{x \cdot C}{x \cdot o}$. In the telescope in-

vented by Sir Wm. Herschel there is no second speculum, and no perforation in the centre of the larger one placed at the bottom of the tube. The latter is fixed in an inclined position so that the image formed by reflection falls near the lower side of the tube at its open end or mouth, where it is viewed directly by an eye-piece, without greatly interfering with the light. This arrangement, in the case of large reflectors, is imposed by their great weight and difficult management. Were it otherwise the ordinary construction would be preferred, the inclination of the speculum being a disadvantage. Chromatic aberration, which arises from the different refrangibilities of the different coloured rays, and leads to the formation, by a lens, of a separate image of a bright object for each coloured ray, is remedied by achromatizing the lens, that is, by constructing it of two or more lenses of different kinds of glass, so that the colours, separated by one, shall be reunited by the others. (See *Achromatic*.) The most powerful refracting telescope yet made is that in the Yerkes Observatory, Wisconsin, which has an object-glass 40 in. in diameter. The Rosse telescope at Parsonstown, Ireland, is the largest reflecting telescope, having a speculum 6 feet in diameter, but it is not so perfect as the recently completed reflector erected by Mr. Ainslie A. Common at Ealing, near London. A large number of refracting telescopes of 13 inches

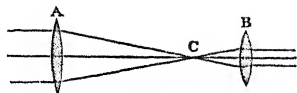


Fig. 1.

sorts of telescopes. In fig. 1, which illustrates the refracting telescope in its simplest form, A and B are two lenses of different focal lengths. Rays of light from a distant object falling upon the object-glass A are converged to a focus at c. The eye-glass B, placed at its focal distance from the point of convergence, gathers up the diverging rays and carries them parallel to the eye, magnifying the image formed at c. (See *Optics*.) The magnifying power of the instrument is as $AC : CB$, or as the focal length of one lens to that of the other. In this construction the object is seen inverted or turned upside down, and hence it is unsuitable for terrestrial purposes. To render the image erect, and thus show it in its natural position, a more complicated eye-piece, consisting of two additional lenses, is necessary. Another refracting telescope, consisting of two lenses in its simplest form, is called the Galilean telescope. It differs from the former in having a concave lens for its eye-glass, which lens is placed nearer the object-glass than the focus of this lens, producing an image which is not inverted. This kind of telescope is the one used in opera-glasses

diameter have recently been constructed with which to conduct the photographic survey of the heavens, a camera being attached to the eye-piece end of each.

Telford, THOMAS, engineer, born in 1757 in Eskdale, Dumfriesshire, became a mason and worked at his trade in Edinburgh, which in 1782 he quitted for London. Here he was befriended by Sir William Pulteney, through whom he was appointed surveyor of public works in Shropshire. He now exchanged his original occupation for that of civil engineer, and was intrusted with the construction of the Ellesmere Canal. In the years



Thomas Telford.

1803 and 1804 the parliamentary commissioners for making roads and building bridges in the Highlands of Scotland, and also those for making the Caledonian Canal, appointed Telford their engineer, and thus an immense amount of work was carried out by him. Above thirty harbours were built or improved by him, some of which, as at Aberdeen and Dundee, were upon an extensive scale. He also superintended the construction of five large bridges over the Severn, the laying down of the Gloucester and Berkeley, the Grand Trunk, Birmingham and Liverpool, and the Macclesfield Canals, and the execution of numerous important works for the metropolis. In 1808 he was employed by the Swedish government to lay out a system of inland navigation through the central parts of that kingdom, which ultimately formed a direct communication by water between the North Sea and

the Baltic. The greatest monument of his engineering skill, however, was the Menai Suspension-bridge, connecting Caernarvonshire with the Island of Anglesea, opened in 1826. The Conway Bridge was also his, as well as the Dean Bridge, Edinburgh, and the Broomielaw Bridge, Glasgow. He died in 1834, and was interred in Westminster Abbey.

Tell. See *Algeria*.

Tell, WILLIAM, a famous peasant hero of Switzerland, reputed to have done some daring and wonderful feats in his resistance to the tyranny of the Austrian governor Gessler, but now proved to have been a mythical personage. He is said to have belonged to the canton of Uri, and to have united with others belonging to this canton and to those of Unterwalden and Schwyz in resisting the Austrians. In particular, having refused to do homage to Gessler's hat, set upon a pole, he was seized and condemned to death, but granted his life on condition of shooting with an arrow an apple placed on the head of his own son. This he did successfully, admitting at the same time that a second arrow he had was intended for Gessler in case of failure. He was therefore still kept a prisoner; but while being conveyed over the Lake of Lucerne he managed to leap ashore, and soon after, having lain in wait for Gessler, he shot the tyrant dead. Those stories professedly belong to the end of the 14th or early part of the 15th century, but contemporary historians know nothing of them; and similar stories belong to the legends and ballads of various peoples.

Tell-el-Kebir', a village of Egypt, near the railway from Cairo to Ismailia and the Freshwater Canal, where the British troops under Wolseley defeated those of Arabi Pasha, 13th September, 1882.

Tellicherry, a seaport of Hindustan, in the presidency of Madras, a healthy and picturesque town, built upon a group of wooded hills, with a citadel or castle in excellent preservation. It is a mart for sandalwood, coffee, and cardamoms. Pop. 27,196.

Tellurium, symbol Te, atomic weight 127.6, a metal discovered in 1782 combined with gold and silver in certain ores found in Hungary. It is found as *native tellurium*; in the form of the oxide TeO_2 as *tellurium ochre*, and combined with silver and gold as *graphic tellurium* or *sylvanite*. It also occurs in arsenical pyrites, and in certain by-products of sulphuric-acid chambers. The metal can be obtained in both

TELPHERAGE — TEMPERANCE SOCIETIES.

crystalline and amorphous modifications, like sulphur and selenium, and it yields compounds which resemble those of selenium, and even of sulphur. With hydrogen it forms a gaseous compound TeH_2 . It forms two oxides, TeO_2 and TeO_3 , and corresponding acids, tellurous acid H_2TeO_3 , and telluric acid H_2TeO_4 . The crystalline metal has a bluish-white colour and a metallic lustre; its specific gravity is 6.24, and its melting-point is 452°C . It is very brittle, and burns with a blue flame.

Telpherage, a system for the automatic transport of goods by means of electricity devised by the late Professor Fleeming Jenkin in 1881. It consists of a line of steel rods or cables suspended from brackets or posts, 70 feet apart, and serving at once as a supporter of weights and a conductor of electricity. Buckets or other receptacles are hung from the line by a wheel or pair of wheels, and a small electrical motor, hanging below the line, supplies the power. Trains of buckets filled with goods may be conveyed at one time, or they may be carried forward in a continuous stream. The system was developed in conjunction with Professors Ayrton and Perry.

Telshi, a town of Russia, in the government of Kovno, 150 miles N.W. of Vilna, on Lake Mastis. Pop. 10,800.

Telugu, or **TELINGA**, one of the languages of India, belonging to the Dravidian group, and spoken in Southern India by about twenty millions of people. The Telugu are the most numerous branch of the Dravidian race, but are less enterprising than the Tamils. The language is allied in roots to the Tamil language, but differs considerably otherwise.

Tem'buland, a district or dependency of the Cape Colony, in the east of which it is situated, adjoining Pondoland and Griqualand East; chief town Umtata. Tembuland has an excellent climate and a fertile soil, well suited for pasture and agriculture. The coast regions are adapted to the growth of sugar, cotton, and coffee. The minerals include coal and copper. Pop. 231,150 (3057 Europeans).

Temesvar (tem'esh-vär), a town of Hungary, in the Temes Banat, in an extensive marshy plain on the Bega Canal, 75 miles N.N.E. of Belgrade. It is strongly fortified, and is for the most part well built, with spacious streets and squares. The principal buildings are a handsome Gothic cathedral and other churches, the government offices,

town-house, theatre, various schools and colleges, arsenal, civil and military hospitals. The manufactures consist of woollens, silks, paper, tobacco, &c. Pop. 49,977.

Temnikov, a town in the Russian government of Tambov, on the Moksha. Pop. 7107.

Tempé, **VALE OF**, a beautiful valley of Northern Greece, in Thessaly, on the Peneus, much celebrated by the ancient poets, having Mount Olympus on the north and Mount Ossa on the south.

Tem'pera. See *Distemper*.

Temperance Societies. The first association for the purpose of influencing public opinion in order to check the evil of intemperance appears to have been formed in Massachusetts in 1813. A year after its formation similar associations were formed in Connecticut and Vermont. In 1826 a new impulse was given to the movement by the establishment in Boston on a more extensive plan of the American Society for the Promotion of Temperance, the first annual report of which announced the formation of thirty, and the second of 220 auxiliary associations. By 1831 more than 2200 societies, embracing 170,000 members, were in correspondence with the parent society. Reports of the movement in America soon began to have an effect on the other side of the Atlantic. In August 1829 a society was formed in Ireland, and before a year had passed sixty organizations, with 3500 members, were in existence. In 1838 a great impetus to the movement was given by the Rev. Theobald Mathew, an Irish Catholic priest, who succeeded in less than two years in persuading 1,800,000 of his countrymen to renounce the use of ardent spirits. The first temperance society in Scotland was established at Maryhill, near Glasgow, in October 1829, and the Greenock and Glasgow and West of Scotland Temperance Societies were constituted soon afterwards. On the 14th of June, 1830, the first temperance society in England was founded at Bradford, and by the close of the year there were in existence some thirty associations, numbering about 10,000 members. Hitherto the members of temperance societies, at least in the great majority of cases, had resolved to abstain merely from ardent spirits, allowing themselves the use of fermented liquors in moderation. But many began to see that it was just as bad to get drunk on beer or wine as on rum, gin, brandy, or whisky. As

early as 1817 a total abstinence society had been formed at Skibbereen, county Cork; it was followed by the formation of a similar society in Dunfermline in 1830, and that by others in Paisley, Glasgow, Greenlaw, and elsewhere. In 1832 the war against intoxicating liquors of all kinds was opened in England by Joseph Livesey of Preston, and by 1838 the total abstinence, or teetotal, party had triumphed all along the line. Since then many advocates of total abstinence have sought to enforce their views by legislative measures, as long ago exemplified in the celebrated Maine Liquor Law, for the suppression of the manufacture and sale of intoxicating beverages in the State of Maine. In Great Britain the Permissive Bill and 'local option' (see those articles) have long been advocated, and such measures as Sunday closing in Wales introduced. Further legislation is still strongly urged, and as a preliminary the Licensing Laws Commission of 1896 was appointed, which issued valuable majority and minority reports, the latter—Lord Peel's—being favoured by many temperance reformers. Latterly the municipalization of the liquor traffic in towns—the 'Gothenburg system'—has been urged by many as a step in advance. Among the principal temperance societies in Great Britain—besides the world-wide Independent Order of Good Templars, which originated in America (see *Good Templars*)—are the National Temperance League, founded in London in 1856; the United Kingdom Alliance (the Permissive Bill party), founded in 1853; the Scottish Temperance League, established in 1844; the Irish Temperance League; the Church of England Temperance Society, organized in 1873; societies in connection with the Established and United Free Churches of Scotland, the Protestant Episcopal Church in Ireland, and with the various Dissenting bodies throughout the kingdom; the Band of Hope Union; &c. Other national societies are principally benefit societies, among the chief of which are the Sons of Temperance; the Independent Order of Rechabites; and the Sons of Phœnix. There are also numberless local and district societies.

Temperature may be expressed as the state of a body with regard to heat, or the state of a body considered with reference to its power of communicating heat to other bodies. It often refers to the atmospheric heat of a locality at a particular time. When

we speak of a body having a 'high' or a 'low temperature' it is implied that the condition of heat in the body may be compared with some standard. The means of such comparison is the thermometer. See *Thermometer*.

Temperature of Animals. See *Animal*.

Tempering, in metallurgy, the process of giving to metals, principally iron and steel, the requisite degree of hardness or softness, especially the process of giving to steel the necessary hardness for cutting, stamping, and other purposes. If heated and suddenly cooled below a certain degree it becomes as soft as iron; if heated beyond that degree, it becomes very hard and brittle. The process essentially consists in plunging the steel when red-hot into cold water or other liquid to give an excess of hardness, and then gradually reheating it until the hardness is reduced or brought down to the required degree. The excellence of all cutting steel instruments depends on the degree of temper given to them. Different degrees of temper are indicated by different colours which the steel assumes. Thus steel heated to 450°, and suddenly cooled, assumes a pale straw colour, and is employed for making razors and surgical instruments. See *Steel*.

Templars, an order of knights which had its origin in the Crusades. Hugues de Payens, Geoffroi de St. Omer, and others established it in 1118 for the protection of pilgrims in Palestine. Subsequently its object became the defence of the Christian faith, and of the holy sepulchre against the Saracens. The knights took the vows of chastity, of obedience, and of poverty, like regular canons. King Baldwin II. of Jerusalem gave them an abode in that city on the east of the site of the temple, and Pope Honorius II. confirmed the order in 1128. The fame of their exploits procured them numerous members and rich donations. The knights wore a white cloak adorned with an eight-pointed red cross (Maltese) on the left shoulder. The grand-master, the chief of the order, had the rank of a prince, and the order acknowledged the pope alone as its protector. The principal part of its possessions were in France. The Templars established themselves in England about 1185, taking up their head-quarters in Fleet Street, London, at the place still known as the Temple. Being compelled, in 1291, to leave the Holy Land, they transferred their chief seat to the island of Cyprus. By this time the wealth and power of the order had

increased to such an extent, and their arrogance and luxury in proportion, that it was deemed necessary to suppress it. The Templars were put an end to on the charge that they had ambitious designs on European thrones, and that they held heretical views. Philip IV. of France and Pope Clement V. played into each other's hands in the work of suppression and spoliation. The grand-master, Jacques de Molay, and sixty knights were inveigled to France on a hollow pretence, and were there seized by the king's orders (Oct. 13, 1307). After the mockery of a trial, and the most horrible tortures, fifty-four knights were burned alive (1310). Charles of Sicily and Provence imitated the example of Philip, and shared the booty with the pope. In England, Spain, Portugal, Italy, and Germany the Templars, at the pope's instigation, were arrested, but almost universally acquitted. The pope, at the Council of Vienne, in Dauphiny, solemnly abolished the order by a bull of March 2, 1312. The Templars maintained themselves longest in Germany, where they were treated with justice and mildness. The members who were discharged from their vows entered the order of St. John.

Template. See *Templet*.

Temple (Latin, *templum*), in architecture, an edifice designed for the performance of public worship. Magnificent temples were erected in ancient Greece and Rome, the Romans taking the Greek structures for models. The general arrangement of a Grecian temple is described in the article *Greece*. The Egyptian temples were also remarkable structures. (See *Egypt*.) The most remarkable temple in the world, however, was that built by Solomon on Mount Moriah in Jerusalem. It was an oblong stone building, 60 cubits in length, 20 in width, and 30 in height. On three sides were corridors, rising above each other to the height of three stories. The fourth or front side was open, and was ornamented with a portico, 10 cubits in width, supported

by two brazen pillars. The interior was divided into the most holy place, which contained the ark of the covenant, and was separated by a curtain from the sanctuary, in which were the golden candlesticks, the table of the shew-bread, and the altar of incense. The temple was surrounded by an inner court, which contained the altar of burnt-offering. Colonnades, with brazen gates, separated this court of the priests from the outer court, which was likewise surrounded by a wall. This temple was destroyed by the Assyrians, and after the return from the Babylonish captivity a second temple, but much inferior in splendour, was erected. Herod the Great rebuilt it of a larger size, surrounding it with four courts, rising above each other like terraces, the lowest of which was 500 cubits square, and was surrounded on three sides by a double, and on the fourth by a triple row of columns. In the middle of this inclosure stood the temple, of white marble richly gilt, 100 cubits long and wide, and 60 cubits high, with a porch 100 cubits wide. This magnificent edifice was destroyed by the Romans in A.D. 70.

Temple, **THE**, a district of the city of London, lying between Fleet Street and the Thames, and divided by Middle Temple Lane into the Inner and the Middle Temple, belonging to separate societies (see *Inns of Court*), each with its hall, library, and garden. The name is derived from the Knights Templars, who had their head-quarters in England here. The district, which is extra-parochial, being exempt from the operation of the poor-law, is occupied, with few exceptions, entirely by barristers and solicitors.

Temple, **SIR WILLIAM**, an eminent statesman, born in London in 1628, and educated at Emanuel College, Cambridge. He afterwards passed six years in France, Holland, Flanders, and Germany. On his return (1654), not choosing to accept office under Cromwell, he occupied himself in the study of history and philosophy. After the Restoration (1660) he was nominated one of the commissioners from the Irish Parliament to the king. On the breaking out of the Dutch war (1665) he was employed in a mission to the Bishop of Münster, who offered to attack the Dutch, and in the following year was appointed resident at Brussels, and received the honour of a baronetcy. In conjunction with De Witt he concluded the treaty between England, Holland, and Sweden (Triple Alliance, 1668), the result being



Templar.
Monument in Temple
Church, London.

to oblige France to restore her conquests in the Netherlands. He also attended, as ambassador extraordinary, when peace was concluded between France and Spain at Aix-la-Chapelle (1668), and subsequently residing at the Hague as ambassador, became familiar with the Prince of Orange, afterwards William III. Recalled in 1669, Sir William remained in retirement at Sheen till 1674, when he was again ambassador to the states-general, and engaged in the Congress of Nimeguen, by which a general pacification was latterly effected, 1679. He was instrumental in promoting the marriage of the Prince of Orange with Mary, eldest daughter of the Duke of York (James II., 1677). Shortly after his return he was elected to represent the University of Cambridge in parliament. In 1681 he retired from public life altogether, and he died at Moor Park, Surrey, in 1699. Here Swift was an inmate of his house for some time. His Memoirs and Letters are especially interesting to the student of history. His Miscellanies consist of essays on various subjects: Gardening, The Cure of the Gout, Ancient and Modern Learning (an essay in which originated the Phalaris Controversy—see *Bentley*), Health and Long Life, Poems and Translations, &c.

Temple Bar, an arched gateway which formerly stood between Fleet Street and the Strand in London and divided the City from Westminster. As the gate obstructed a crowded thoroughfare, it was found necessary to remove it (1878). It was re-erected at Theobald's Park, Cheshunt, in 1888.

Templet, a pattern or mould used by masons, machinists, smiths, shipwrights, &c. It usually consists of a flat thin board, a piece of sheet-iron, or the like, whose edge is dressed and shaped to the required conformation, and is laid against the object being moulded, built, or turned so as to test the conformity of the object thereto.

Tempo (Italian for 'time'), in music, a word used to express the rate of movement or degree of quickness with which a piece of music is to be executed. The degrees of time are indicated by certain words such as *lento* (slow), *adagio* or *largo* (leisurely), *andante* (walking pace), *allegro* (gay or quick), *presto* (rapid), *prestissimo* (very rapid), &c.

Temporal Bones. See *Skull*.

Temryuk, a fortified town of South Russia, in the Kuban district of the Caucasus, on a peninsula on the south side of the Sea of Azov, in the bay of Temryuk. Pop. 14,500.

Tenacity, the measure of the resistance of bodies to tearing or crushing. Tenacity results from the attraction of cohesion which exists between the particles of bodies, and the stronger this attraction is in any body the greater is the tenacity of the body. Tenacity is consequently different in different materials, and in the same material it varies with the state of the body in regard to temperature and other circumstances. The resistance offered to tearing is called *absolute tenacity*, that offered to crushing, *retroactive tenacity*. The tenacity of wood is much greater in the direction of the length of its fibres than in the transverse direction. With regard to metals the processes of forging and wire-drawing increase their tenacity in the longitudinal direction; and mixed metals have, in general, greater tenacity than those which are simple.

Tenail, **TENAILLE**, in fortification, an out-work or rampart raised in the main ditch immediately in front of the curtain, between two bastions, in its simplest form having two faces constituting a re-entering angle.

Tenant, in law, one who occupies, or has temporary possession of lands or tenements, the titles of which are in another, the landlord. A *tenant-at-will* is one who occupies lands or tenements for no fixed term other than the will of the landlord. A *tenant in common* is one who holds lands or tenements along with another or other persons. Each share in the estate is distinct in title, and on the death of a tenant his share goes to his heirs or executors. A *tenant for life* (in Scotland, a *lifereiter*) is one who has possession of a freehold estate or interest, the duration of which is determined by the life of the tenant or another. An estate for life is generally created by deed, but it may originate by the operation of law, as the widow's estate in dower, and the husband's estate by courtesy on the death of his wife. See *Landlord and Tenant*.

Tenant-right, a term specifically applied to an Irish custom, long prevalent in Ulster, either ensuring a permanence of tenure in the same occupant without liability to any other increase of rent than may be sanctioned by the general sentiments of the community, or entitling the tenant of a farm to receive purchase-money amounting to so many



Templet for a Baluster.

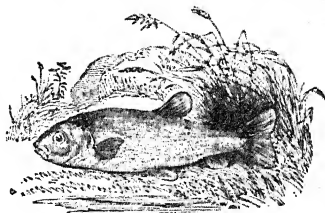
years' rent, on its being transferred to another tenant; the tenant having also a claim to the value of permanent improvements effected by him. In course of time the advantages of tenant-right granted to the Ulster farmers were claimed by the farmers in the other provinces of Ireland, and the custom spread to a considerable extent. At last the Landlord and Tenant Act of 1870 was passed, by which the Ulster tenant-right and other corresponding customs received the force of law; and the outgoing tenant became entitled to compensation from the proprietor to an amount varying according to circumstances. The tenant's position was further improved by the Land Law Act, 1881, and subsequent acts. (See *Ireland*.) In Great Britain also the position of agricultural tenants has been improved by legislation, more particularly by the Agricultural Holdings Act of 1883, which assures tenants of certain customary rights and expressly adds others, especially the right of compensation for definite improvements made in their holdings.

Tenas'serim, a maritime division of Burmah, about 500 miles in length, and from 40 to 80 in breadth; area, 46,730 sq. miles. The eastern boundary is formed by a range of mountains; the coast is for the most part rocky; and in the south is fringed by the innumerable islands of the Mergui Archipelago. There are several good harbours, formed by the mouths of the rivers. Tenasserim is a hilly and densely wooded region, with here and there tracts of arable land. It passed into the hands of the British at the close of the first Burmese war in 1826. Maulmain is the capital; other towns are Tavoy, Amherst, Mergui. Pop. 1,137,800.

Tenby, a municipal borough and seaport of Wales, in the county of Pembroke, on the west side of Carmarthen Bay, on the point and north-east margin of a rocky peninsula. It has a fine old church and several other buildings of note, including the Welsh Memorial to the late Prince Consort, and carries on a considerable trade in fish and oysters. It is besides a bathing-place, celebrated for its fine sands, beautiful scenery, and agreeable climate. The old walls of the town are still to some extent preserved. Pop. 4400. See *Pembroke*.

Tench, a teleostean fish belonging to the carp family and genus *Tinca*, of which *T. vulgaris* (the common tench) is the type. It inhabits most of the lakes of the Euro-

pean continent, and in Britain it is frequent in ornamental waters and ponds. It attains a length of from 10 to 12 inches. The colour is generally a greenish-olive



Tench (*Tinca vulgaris*).

above, a light tint predominating below. It is very sluggish, apparently inhabiting bottom-waters, and feeding on refuse vegetable matter. It is very tenacious of life, and may be conveyed alive in damp weeds for long distances. The flesh is somewhat coarse and insipid.

Tender, in law, an offer of compensation or damages made in a money action. To make a tender valid the money must be actually produced. A tender made to one of several joint claimants is held as made to all. A tender of money for any payment is legal, and is called a *legal tender*, if made in current coin of the realm, in bronze coins to the extent of 1s., in silver coins to the extent of 40s., and in gold to any amount. Bank of England notes are a legal tender for amounts above £5.

Tender (naval), a small vessel appointed to attend a larger one, and employed for her service in procuring stores, &c. In railways a tender is a carriage attached to the locomotive for carrying the fuel, water, &c.

Tendon, the name given to the 'sinews' by means of which muscles are inserted upon bones. They consist of bundles of white fibrous inelastic and very strong tissue disposed in bands, and separated by areolar or connective tissue. See *Achilles Tendon*.

Tendrill. See *Cirrus*.

Teneb'rio, a genus of beetles. The larvae of one species (*T. molitor*) are the destructive meal-worms of granaries, flour-stores, &c. See *Meal-worm*.

Ten'edos, an island of Asiatic Turkey, on the west coast of Asia Minor, 15 miles south-west of the Dardanelles, about 6 miles long and 3 miles broad. The channel which separates it from the mainland is 3 miles broad. The interior of the island is very fertile, and

is remarkable for the excellence of its wines. Corn, cotton, and fruits are also produced. On the eastern side of the island, near the sea, is the town of Tenedos. Pop. between 6000 and 7000.

Teneriffe, **TENERIFFA**, the largest of the Canary Islands (which see), is of an irregularly triangular form, and has an area of about 780 square miles. It is of volcanic formation, composed principally of enormous masses and cones of trachyte, lava, and basalt, which culminate in the Peak of Teneriffe, 12,182 feet high. The coast consists of an almost uninterrupted series of lofty cliffs, and the only good harbour is that of Santa Cruz, the capital, on the north-east. The most remarkable feature of the interior is the celebrated Peak, the summit of which forms a crater half a league in circuit, and from which is obtained one of the most magnificent views in the world. Two eruptions have taken place since the colonization of the island by the Spaniards in 1496, namely, in 1706 and 1798, and at all times the internal activity of the volcano is indicated by frequent streams of hot vapour. The principal productions are maize, wheat, potatoes, tomatoes, bananas, almonds, oranges, guavas, honey, wax, cochineal, and wine. Tomatoes, bananas, potatoes, and wine are the chief exports. Pop. 138,000.

Tenesmus, in medicine, a continual inclination to void the contents of the bowels, accompanied by straining, but without any discharge. It is a common symptom in dysentery, stricture of the urethra, &c.

Teniers (ten-ērs'), **DAVID**, the name of two celebrated artists of the Flemish school, father and son, both natives of Antwerp, in which city the elder was born in 1582. Having studied under Rubens, he spent six years in Rome. On his return he occupied himself principally in the delineation of fairs, rustic sports, and drinking parties, which he exhibited with such truth, humour, and originality, that he may be considered the founder of a style of painting which his son afterwards brought to perfection. His pictures are mostly small. He died in 1649.—His son was born in 1610, and was taught painting by his father, whom he excelled in correctness and finish. He became highly popular, was appointed court painter to the archduke Leopold William, governor of the Netherlands, and gave lessons in painting to Don John of Austria. He specially excelled in outdoor scenes, though many of his interiors are masterpieces of colour and composition.

His general subjects were fairs, markets, merry-makings, guard-rooms, taverns, &c., and his pictures, which number over 700, are found in all the important public and private galleries of Europe. His etchings are also highly esteemed. He died at Brussels in 1690.

Tenimber Islands. See *Timor Laut*.

Tennant, **WILLIAM**, a Scottish poet of some note, born at Anstruther, Fifeshire, in 1784, studied for some time at the University of St. Andrews, was for several years a clerk, devoted himself then to teaching, and, being a good oriental linguist, was in 1835 appointed to the chair of oriental languages in St. Mary's College, St. Andrews, dying in 1845. His chief production is *Anster* (that is, Anstruther) *Fair*, a humorous poem of Scottish life in the same stanza as Byron's *Don Juan*, which it preceded, being published in 1812. Besides *Anster Fair*, Tennant was the author of several other poems and some dramas. None of them, however, attained any success. Grammars of the Syriac and Chaldee tongues were also published by him.

Tennent, **SIR JAMES EMERSON**, statesman and writer, was born at Belfast in 1794, educated at Trinity College, Dublin, called to the bar in 1831, and elected in 1832 member of parliament for his native town, for which place he continued to sit with little interruption till 1845, when he was returned for Lisburn. Meanwhile he had held under Peel the secretaryship of the Board of Trade. From 1845 to 1850 he was civil secretary to the government of Ceylon; in 1852 he was secretary to the Poor-law Board; and from 1852 to 1867 he held the post of secretary to the Board of Trade, on retiring from which he received a baronetcy. He was the author of several books of travel and other works, the most important being a valuable account of Ceylon (1859, two vols.). He died in 1869.

Tennessee, one of the United States of North America (admitted into the Union in 1796), is bounded on the north by Kentucky and Virginia, east by North Carolina, south by Georgia, Alabama, and Mississippi, and west by Arkansas and Missouri; area, 42,050 square miles. Tennessee is popularly divided into three sections. East Tennessee, an extensive valley, and agriculturally one of the most important sections of the state, stretches from the eastern boundary to the middle of the Cumberland table-land, which has an average elevation of 2000 feet above the sea, and abounds in coal, iron, and other

minerals. Middle Tennessee extends from the dividing line on the table-land to the lower Tennessee river; and West Tennessee, from the Tennessee river to the Mississippi. The Unaka Mountains, a part of the Appalachian chain, run along the eastern frontier, and have an average elevation of 5000 feet above the sea. The Mississippi, with the Tennessee and the Cumberland, drains three-fourths of the state. The two latter are navigable for a considerable distance, and other rivers with numerous tributaries supply valuable water power. The climate is very healthy, the mean temperature of winter being 37° 8', and of summer 74° 4'. The principal grain crops are Indian corn, wheat, and oats; and cotton, tobacco, flax, and hemp are extensively cultivated. The rearing and fattening of live stock are carried on under peculiar advantages, and immense numbers of hogs grow up on the mast of the forests, which cover a very large area. The most valuable minerals found are coal, iron (both worked to a considerable extent), copper, marble, limestone, sandstone, granite, roofing slate, potters' clay, and kaolin. Also among the other minerals are gold (not found in paying quantities), lead, zinc, baryta, copperas, asbestos, &c. Petroleum, sulphur, chalybeate and salt springs are plentiful. The leading manufactures are iron and steel, cotton and woollen goods, furniture, cars, leather, oils, wines, spirits, &c. Besides the facilities for traffic afforded by the navigable streams, internal communication is further provided for by an extensive system of railways. The chief educational institutions include the University of Tennessee, Knoxville; University of Nashville; Vanderbilt University, and Fisk University (coloured), also at Nashville; besides others. The chief towns are Nashville (the capital), Memphis, Chattanooga, and Knoxville. Pop. 2,022,723.

Tennessee, a river of the United States, formed by the union of two streams in the eastern part of the state of Tennessee, flows south-west, passes through the northern part of Alabama, then flows north through the western part of Tennessee and Kentucky, and enters the Ohio, of which it is the largest tributary, about 10 miles below the confluence of the Cumberland. Length, about 1200 miles. It is navigable 259 miles for steamers to Florence, at the foot of the Mussel-shoal Rapids, which are passed by a canal 36 miles long; and above these there is navigation for boats for 250 miles,

Tenniel, SIR JOHN, a famous artist in black and white, was born in London in 1820. He was almost entirely self-taught, and his first picture was exhibited while he was little more than a boy. He painted one of the frescoes in the Houses of Parliament in 1845, and has produced few pictures since. In 1851 he became connected as an illustrator with *Punch*, and for fifty years contributed illustrations to that paper, especially the weekly political cartoon. He has also illustrated various books, including *Æsop's Fables*, *Ingoldsby Legends*, *Alice's Adventures in Wonderland*, &c. He was knighted in 1893.

Tennis, a game in which a ball is driven continually against a wall in a specially constructed court, and caused to rebound beyond a line at a certain distance by several persons striking it alternately with a racket, the object being to keep the ball in motion as long as possible without allowing it to fall to the ground. The game was introduced into England in the 13th century, and continued to be very popular with the nobility to the reign of Charles II. The modern game of rackets is a descendant of tennis. (See *Rackets*.) *Lawn Tennis* is a recent modification of the game. See *Lawn Tennis*.

Tennyson, ALFRED, LORD, third son of George Clayton Tennyson, rector of Somersby, in Lincolnshire, was born at the same place on 6th Aug. 1809. He received his early education from his father, attended Louth Grammar School, and in due course proceeded to Trinity College, Cambridge, where in 1829 he won the chancellor's medal by a poem in blank verse entitled *Timbuctoo*. As early as 1827 he had published, in conjunction with his brother Charles, *Poems by Two Brothers*, but his literary career may be said to date from 1830, when he published a volume entitled *Poems*, chiefly *Lyrical*. It was not received with any great favour by the public, although it was recognized by many to contain much that distinguishes the true poet. Its success at least was sufficient to encourage the poet to prepare a second collection, which appeared in 1833, and contained such poems as *A Dream of Fair Women*, *The Palace of Art*, *Enone*, *The Lady of Shalott*, and others. At this time he sustained a great loss in the death of his friend Arthur Hallam, and this, with the severe criticism which his last volume received in *Blackwood's Magazine* and the *Quarterly Review*, may have

occasioned his long silence. It was not till 1842 that he again appealed to the public with a selection of his poems in two volumes, and it is from this time that we find his work beginning to receive wide recognition. The collection then issued included *Morte d'Arthur*, *Locksley Hall*, *The May Queen*, and *The Two Voices*, all of which, it was almost at once acknowledged, entitled him to rank very high amongst our poets. His reputation was more than sustained by the works that immediately followed. These



Alfred, Lord Tennyson.

were: *The Princess*, a Medley (1847); *In Memoriam* (1850), written in memory of his friend Arthur Hallam; and *The Ode on the Death of the Duke of Wellington* (1852). The latter was his first great poem after receiving the laureateship (1850) upon the death of Wordsworth. From that time hardly a year passed without his adding some gem to our language. *Maud* and other Poems was published in 1855; *Idylls of the King* followed in 1859; *Enoch Arden* and other Poems, in 1864; *The Holy Grail* and other Poems, in 1869; *The Window*, or the Songs of the Wrens, in 1870; and *Gareth and Lynette*, and the *Last Tournament*, two of the poems known as the *Idylls of the King*, in 1872, this series being completed by *Balin and Balan* in 1885. In 1855 Oxford University conferred on him the degree of D.C.L., and in 1869 the fellows of Trinity College, Cambridge, elected him an honorary fellow. So long ago as 1833 he had printed for private circulation a poem entitled *The Lover's Tale*; in 1879 this was republished, together with a sequel entitled

The Golden Supper. In the following year appeared *Ballads* and other Poems. From 1875 onwards he gave various dramas to the public: *Queen Mary* (1875), *Harold* (1876), *The Cup* (1881), *The Falcon* (1882), *The Promise of May* (1882), *Beckett* (1884), and the *Foresters* (1892). Several of these were put upon the stage. The *Cup* was successfully produced by Mr. Irving at the Lyceum Theatre in 1881, as had also been *Queen Mary*. The *Falcon* was produced in 1882, and the *Promise of May* the same year. The *Cup* and *The Falcon* were published as a single volume in 1884. In 1885 appeared *Tiresias* and other Poems; in 1886 *Locksley Hall: Sixty Years After*; in 1889 *Demeter* and other Poems, and in 1892 (posthumously) *The Death of Eneone* and other Poems. Some of his later volumes contain work of as high a quality as any of his earlier. Tennyson was raised to the peerage as Baron Tennyson in 1884. He died 6th Oct., 1892. Few writers have developed so rare a mastery of English as a poetic instrument, and his works are assured of a high rank in the ultimate judgment of the literature of the 19th century.—His brother CHARLES (born 1808, died 1879) assumed the name of *Turner* by royal licence on succeeding to property at the death of his grandmother. He published, in conjunction with his brother, *Poems by Two Brothers* (Louth, 1827), now a great bibliographical rarity. He became vicar of Grasby, Lincolnshire, in 1835, and published *Sonnets* (1864), *Small Tableaux* (1868), and *Sonnets, Lyrics, and Translations* (1873).—Another brother, FREDERICK, published several volumes of meritorious poems, including *Days and Hours*, *The Isles of Greece*, *Daphne* and other Poems.

Tenor (in Italian, *tenore*), in music, is the more delicate of the two adult male voices, and its compass generally extends from C in the bass to G or A in the treble. The qualities of the tenor render it suitable to the expression of tender and delicate sentiments. In a vocal composition of four parts the tenor forms the second middle part, deeper than the alto, but higher than the bass; but in the song of four male voices the tenor, as the first voice, leads the chief melody, and as the second is the higher middle voice. The clef of this voice is the C clef, placed upon the fourth line of the staff, as here shown.



Tenrec. See *Tanrec*.

Tent, a portable dwelling-place, formed usually in the simplest manner, of canvas,

for instance, stretched with cords upon poles. The tents of private soldiers in the British service are of a conical form with circular basis, supported by a vertical pole in the centre 10 feet high. The outside diameter of the tent, which accommodates fifteen infantry or twelve cavalry soldiers, is 17 feet 3 inches. The officers' marquees, as well as the hospital and laboratory tents, are oblong, and are supported by two standards connected by a ridge pole 6 or 7 feet long. The soldiers' tents in the U. States army are of the ridged variety.

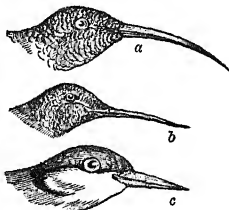
Tentacle, in zoology, an elongated appendage proceeding from the head or cephalic extremity of many of the lower animals, and used as an instrument of exploration and prehension. Thus the arms of the sea-anemone, the prehensile processes of the cirri-peds and annelids, the cephalic feet of the cephalopods, the barbs of fishes, are termed *tentacles*.

Ten'terden, a market-town and municipal borough in the county of Kent, 50 miles south-east of London. It consists chiefly of one main street, and has a handsome church, a town-hall, &c. Pop. 3243.

Tenthre'do. See *Saw-flies*.

Ten'tyra, or **TENTYRIS**. See *Denderah*.

Tenuiro'stres (slender-beaked), one of the four sections into which the order *Insesores* of birds is divided. This group, represented by the humming-birds, creepers, sun-birds, hoopoes, &c., is characterized by the generally elongated bill, which usually tapers to a point.



Heads of *Tenuirostres*.

a, Sun-bird (*Nectarinia afra*).
b, Humming-bird (*Trochilus re-cinctirostris*). c, European Nuthatch (*Sitta europea*).

Tenures. See *Land*, *Tenure of*.

Teocallis ('houses of God'), the name given to the ancient temples of Mexico, of which there are extensive remains. They were generally solid four-sided truncated pyramids, built terrace-wise, with the temple proper on the platform at the summit. They were constructed of earth, faced with brick, and many still remain in a more or less perfect state. The principal existing specimens are those of Cholula, near Mexico, and of Palenque, in Yucatan. See *Cholula* and *Palenque*.

Teos, or **TIOS**, anciently a town on the coast of Ionia, in Asia Minor, opposite Samos, the birthplace of the poet Anacreon.

Tepic, a town of Mexico, in the territory of Tepic, pleasantly situated, and rendered peculiarly attractive by terraced gardens and shady promenades. It has manufactures of woollens and sugar, and mines in the neighbourhood. Pop. 15,488.

Teplitz, or **TÖPLITZ**, a town of Northern Bohemia, pleasantly situated in a valley between the Erzgebirge and Mittelgebirge, with a castle and fine park and gardens. It has celebrated thermal baths. The springs, seventeen in number, have a temperature varying from 99°·5 to 108°·5, and are efficacious in cases of gout and rheumatism. The bathing establishment is very complete, and during June and July the whole town is filled with visitors. Pop. 24,420.

Teraí. See *Turai* and *Himalaya*.

Ter'amo, a town of Southern Italy, capital of the province of same name, in an angle formed by the confluence of the Tordino and Vezzola. It is the see of a bishop, and has an old though modernized cathedral and remains of Roman baths and theatre. Pop. 12,000.

Ter'aphim, household deities or images, revered by the ancient Hebrews. They seem to have been either wholly or in part of human form and of small size, were regarded as *penates* or household gods, and in some shape or other used as domestic oracles. They are mentioned several times in the Old Testament.

Teratology, the division of physiological and anatomical science devoted to the investigation of abnormalities in the structure of animals and plants, and to the determination of the exact nature of the deviation from a normal type of structure.

Terbium was the name given to a supposed earth-metal now found to be nearly identical with erbium, and which has been resolved into several elements.

Terburg, or **TERBORCH**, GERARD, a Dutch portrait and genre painter, born at Zwolle, near Overysse, about 1617. His father, a historical painter, gave him his first lessons in painting. He continued his studies at Haarlem, and afterwards visited Germany, Italy, Spain, England, and France. On the meeting of the peace congress at Münster in 1646 he painted the assembled plenipotentiaries, which is now in the National Gallery, London. He subsequently visited Madrid, London, and Paris, whence he returned to

Overijssel, married, and became burgomaster of Deventer, dying in 1681. His portraits and pictures of social life are remarkable for elegance. He excelled in painting textile fabrics, particularly satin and velvet.

Terce is a legal life-rent amounting to one-third of her deceased husband's landed estates recognized by the law of Scotland in favour of a widow who has not accepted of any special provision.

Terceira (ter-sā'i-rā), an island of the Atlantic, one of the Azores; greatest length, 20 miles; average breadth, 13 miles; area, 223 square miles. The soil possesses great natural fertility, and heavy crops of grain, pulse, &c., and abundance of oranges, lemons, and other fruits are produced. The capital is Angra. Pop. 48,920.

Ter'ebinth, the common name for various resinous exudations, both of a fluid and solid nature, such as turpentine, frankincense and Burgundy pitch, Canada balsam, &c. The volatile oil of various of these resins is called oil of terebinth, or oil of turpentine. Terebinth is also a name for the turpentine-tree (which see).

Terebratula (ter-ē-brat'ū-la), a genus of deep-sea brachiopod bivalve molluscs found moored to rocks, shells, &c. One of the valves is perforated to permit the passage of a fleshy peduncle, by means of which the animal attaches itself. There are few living species, but the fossil ones are numerous, and are found most abundantly in the secondary and tertiary formations.

Tere'do. See *Ship-worm*.

Terek, a Russian river which descends from Mount Kasbek, on the north side of the Caucasus, and flows into the Caspian by several mouths; length, 350 miles. It gives its name to a territory; pop. 933,500.

Ter'ence, in full **PUBLIUS TERENTIUS AFR** (that is, 'the African'), a celebrated Roman comic writer, born in Africa B.C. 195, and while a child bought by Publius Terentius Lucanus, a Roman senator, who took him to Rome and gave him a good education. His master having emancipated him, the young African assumed the name of his benefactor, and soon acquired reputation and friends by the talents which he displayed in his comedies. About the year 161 he went to Greece, where he translated 108 of Menander's comedies. According to some accounts he died in Greece, according to others he was drowned on his passage back to Italy. His translations appear to have been materials for future works of his own. Six comedies

of Terence's alone are extant, and these are all he is known to have produced—The Andrian; The Eunuch; Heautontimoroumenos, or the Self-tormentor; Phormio, or the Parasite; Hecyra, or the Stepmother; and The Adelphi, his last piece, brought out in Rome the year before his death. His language is pure; but in originality and imagination he is inferior to his predecessor Plautus. His comedies have been translated into English by the elder Coleman and several others.

Tere'sa, Sr. See *Theresa*.

Tereus (tē'rūs). See *Philomela*.

Terlizzi (ter-lit'ss), a town of South Italy, in the province of Bari. It contains a palace, with a good collection of pictures; and two churches, one of them enriched by some pictures of Titian. Pop. 20,442.

Ter'mini, a town of Sicily, in the province of Palermo, on a height in a rich and well-cultivated district, near the mouth of a river of the same name, which falls into the Tyrrhenian Sea. It is surrounded with walls, and defended by a strong castle. Corn, oil, olives, and other products of the district are exported, and there is an active fishing industry. It is noted for its thermal saline baths. Pop. 22,649.

Termites (ter'mits), a family of neuropterous insects, also known by the name of *white ants*. They have little affinity with the true ants, which are hymenopterous, although they resemble them in their mode of life. They are chiefly confined to the tropics, and are found very plentifully in Western Africa. They unite in societies, building their dwellings in the form of pyramids or cones, 10 or 12 feet high. These dwellings, which are so firmly cemented as to be capable of bearing the weight of three or four men, are divided off into several apartments as magazines, chambers, galleries, &c. Every colony of termites consists of a king and queen, both of which are much larger than the other members of the colony, and of workers and soldiers without wings. The king and queen are the parents of the colony, and are constantly kept together, attended by a detachment of workers, in a large chamber in the heart of the hive, surrounded by stronger walls than the other cells. The queen is always gravid, the abdomen being enormously distended with eggs, which, as they are dropped, relays of workers receive and convey in their mouths to the minor cells throughout the hive. At the beginning of the rainy season a number of winged insects, both male and female, are

produced. These, when mature, leave the hive and fly abroad, afterwards shedding their wings, and becoming the kings and queens of future colonies. The soldiers and workers, both neuter, or of no fully developed sex, and differing merely in the armature of



Dwellings of Termites.

the head, are distinct animals from the moment they leave the egg, the young differing from the adult of the same class only in size. The duties of the workers are to build the habitations, make covered roads, nurse the young, attend on the king and queen, and secure the exit of the mature winged insects, while to the soldiers, whose mandibles are powerfully developed for that purpose, is committed the defence of the community, which duty they perform systematically and with desperate courage. There are many species of termites, all of which are fearfully destructive to wood.

Termonde. See *Dendermonde*.

Terms, periods or times connected with law courts, universities, &c. In England the law terms, or periods when the superior courts sat, up to 1873 were four, viz. Hilary term, beginning on the 11th and ending on the 31st January; Easter term, beginning 15th April and ending 8th May; Trinity term, beginning 22nd May and ending 12th June; Michaelmas term, beginning 2nd and ending 25th November. The rest of the year was termed *vacation*. The law terms are now superseded by 'sittings', though they partly survive in connection with dinners at the Inns of Court. For terms in universities see *Cambridge*, *Oxford*, &c.; for money terms see *Quarter-days*.

Tern (*Sterna hirundo*), or SEA-SWALLOW, a genus of birds, included in the gull family. The terns are distinguished by the long, slender, and straight bill, long and pointed wings, and forked tail. The legs are rela-

tively shorter than in the gulls. The common tern or sea-swallow is a familiar visitant of British coasts. It is a very active bird, seeming to have a ceaseless flight, and feeding upon small fishes. Its average length is 15 inches. The colour is black on the head and neck, and ashy gray on the upper parts generally. The under parts are white, the legs, feet, and bill being red.

Ternate, one of the Molucca Islands, in lat. 0° 48' N., lon. 127° 19' E.; area, about 25 sq. miles; contains a remarkable volcano (5600 feet), and produces tobacco, cotton, sago, sulphur, saltpetre, &c. The town Ternate is the seat of a native sultan and of the Dutch resident. Pop. 9000.

Terni (ancient *Interamna*), a town of Italy and a bishop's see, in the province of Perugia, on an island formed by the Nera. It has a handsome cathedral (1653, architect Bernini), several other churches, and some Roman antiquities, including the remains of an amphitheatre. The celebrated falls of Velino or Terni are about 5 miles distant from the town. They were originally formed by the Romans to carry off the surplus waters of the Velino. Terni is a flourishing industrial town with works for armour-plates, guns, &c. Pop. 20,000.

Ternstroemia, *ceæ*, a natural order of polypetalous dicotyledonous plants, consisting of trees or shrubs, with alternate simple usually coriaceous leaves without stipules. The flowers are generally white, arranged in axillary or terminal peduncles, articulated at the base. This order is one of great economical importance, as it includes the genus *Thea*, from which the teas of commerce are obtained. The favourite garden camellia also belongs to it. The plants belonging to the order are principally inhabitants of Asia and America.

Terpsichore (têrp-sik'o-rê), one of the Muses, the inventress and patroness of the art of dancing and lyrical poetry.

Terracina (ter-râ-chê'nâ; ancient, *Anagnin*), a seaport of Italy and a bishop's see, in the province of Rome, on a gulf of the same name. It has a handsome episcopal palace, and a cathedral, in a kind of Italo-Byzantine style, on the site of an ancient temple. Pop. 7380.

Terra Cotta (Italian, 'baked earth'), baked clay or burned earth, a similar material to that from which pottery is made, much used both in ancient and modern times for architectural decorations, statues, figures, vases, and the like. As now made

it usually consists of potters' clay and fine powdered silica. It is produced of many different colours, the most pleasing being a rich red and a warm cream colour. Large numbers of ancient statues, and especially statuettes, of terra cotta have been found in recent times, the most charming being the production of the city of Tanagra in Northern Greece (Boeotia).

Terra del Fuego. See *Tierra del Fuego*.

Terra di Sienna, a brown ferruginous ochre employed in painting, and obtained from Italy. It is calcined before being used as a pigment, and is thus known as burnt sienna.

Terra Japonica. See *Catechu*.

Terrano'va, a town of Sicily, in the province of Caltanissetta, on the Mediterranean, near the mouth of the river Terranova, was founded in the 13th century by the emperor Frederick II. on the site of the ancient Gela. It is defended by a strong castle, and contains several handsome churches. There is some export trade in corn, wine, fruit, sulphur, and soda. Pop. 16,440.

Ter'rapin, the popular name of several species of fresh-water or tide-water tortoises constituting the family Emydæ, distinguished by a horny beak, a shield covered with epidermic plates, and feet partly webbed. They are active in their habits, swimming well and moving with greater agility on land than the land-tortoises. They are natives of tropical and warmer temperate countries, many being natives of North America. They feed on vegetables, fish, reptiles, and other aquatic animals. Their flesh is much esteemed. One species, called the salt-water terrapin (*Malachlemys concentrica*), is abundant in the salt-water marshes around Charlestown. The chicken tortoise (*Emys reticularia*), so named from its flavour, is also an esteemed American species.

Terras. See *Trass*.

Terre-Haute (tär-öt; usually pronounced ter-e-hüt'), a town and important railway centre of the United States, Vigo County, Indiana, on the Wabash, and Wabash and Erie Canal. It is well built, and has numerous churches and schools (the state normal school, Rose Polytechnic Institute, &c.), fine courts of justice, and an opera-house; extensive manufactures, and a considerable trade. There are rich beds of coal and iron in the vicinity. Pop. 36,673.

Terre-plein (tär'plan), in fortification, the top, platform, or horizontal surface of a rampart, on which the cannon are placed.

Terrestrial Magnetism. See *Magnetism*.

Terrier, a name for several breeds or varieties of dogs, small or of medium size. The name was originally given to dogs employed to kill vermin and to unearth foxes, badgers, otters, &c. (being from French *terre*, Latin *terra*, earth). The dogs called terriers include the lull terrier, the fox terrier, the English white terrier, the black-and-tan terrier, the Scotch terrier, the Skye terrier, the Irish terrier, the Bedlington terrier, the Airedale terrier, &c. (see articles). Some of these breeds have become prominent and fashionable in quite recent times. The bull terrier has long been known, and no doubt had originally bulldog blood in him. The Scotch terrier (a short-legged, wiry-haired animal, different from the silky-haired Skye terrier) is also an old variety. Some very small terriers are called 'toy' terriers. See *Dogs*.

Territory, a term applied in the U. States to an area similar to a state of the Union, but not having the independent position of a state, being directly under congress and having a governor and other chief officials appointed by the president, with a legislature of certain limited powers. Territories are usually admitted as states on attaining a sufficient population.

Terror, REIGN OF, the term usually applied to the period of the French revolutionary government from the appointment of the revolutionary tribunal and the committee of public safety (6th April, 1793) to the fall of Robespierre (27th July, 1794). See *France (History)*.

Terschelling, an island of the Netherlands, 10 miles off the coast of Friesland, between the islands of Vlieland and Ameland. It is about 15 miles long by 3 broad, is flat and sandy, and exposed in some parts to inundation. The inhabitants are chiefly pilots and fishermen. Pop. 4000.

Tertian Fever. See *Ague*.

Tertiary Formation. See *Geology*.

Tertullian, in full QUINTUS SEPTIMIUS FLORENS TERTULLIANUS, the earliest Latin father of the church whose works are extant, flourished chiefly during the reigns of Septimius Severus and Caracalla (A.D. 193-217), became a presbyter, and continued orthodox till he had reached middle age, when he went over to the Montanists (see *Montanus*), and wrote several books in their defence. His most celebrated work is the Apologia, a formal defence of Christianity addressed to the Roman magistrates. Among other works

whose period is not known is *Adversus Heremogenem*, in which Tertullian maintains the doctrine of the creation of the world out of nothing as opposed to the eternity of matter *per se*. The works of Tertullian display great learning, much imagination, and a keen wit, but their style is bad. They are chiefly valuable for the light they throw on the doctrine and discipline of the church in the age in which he lived.

Teruel', a town of Spain, in the province of the same name, on a hill near the Guadalaviar, 72 miles N.W. of Valencia, with which it carries on an active trade. It is inclosed by walls, has a Gothic cathedral, a bishop's palace, and a seminary. Pop. 9538.—The province has an area of 5730 sq. miles, and a pop. of 246,000.

Teschén (tsh'én), a town of Austrian Silesia, on the right bank of the Olsa, with textile manufactures, &c. Pop. 19,142.

Tesho-lama. See *Lamaism*.

Tessellated Pavement, a pavement of rich mosaic work, made of squares of marbles, bricks, or tiles, in shape and disposition resembling dice, and known as *tesserae*.

Tesserae, small cubes or squares resembling dice, and consisting of different materials, as marble, precious stones, ivory, glass, wood, &c. These *tesserae* were used by the ancients to form the mosaic floors or pavements in houses, for ornamenting walls, &c. See preceding article.

Tessin. See *Ticino*.

Test Act. See *Corporation and Test Acts*.

Testament. See *Will*.

Testament, OLD AND NEW. See *Bible*.

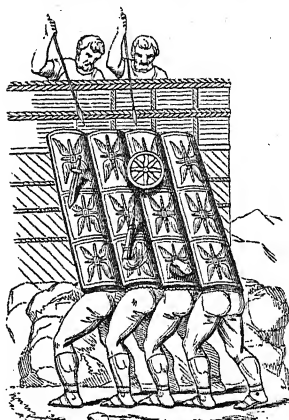
Testing, the process of examining various substances by means of chemical reagents, with the view of discovering their composition. The term testing is usually confined to such examinations as seek to determine what chemical elements or groups of elements are contained in any substance, without inquiring as to the quantity of these elements. Testing is carried out either by the application of chemical reactions to solid substances, or by the application of reagents in solution to a solution of the substance under examination.

Test-papers, slips of unsized paper soaked in solutions of vegetable colouring matters, used as indicators of the presence of acids or of alkalies, and, in some instances, of special chemical compounds. The most common test-papers are litmus and turmeric papers.

Test-plates. See *Noberts' Test-plates*.

Testu'do. See *Tortoise*.

Testudo, among the ancient Romans a cover or screen which a body of troops formed with their oblong shields or targets, by holding them over their heads when



Roman Testudo, from Trajan's Pillar.

standing close to each other. This cover somewhat resembled the back of a tortoise, and served to shelter the men from missiles thrown from above. The name was also given to a structure movable on wheels or rollers for protecting sappers.

Tet'anus, a spasmodic rigidity of the whole body, such as frequently results from wounds, especially in warm climates. If the lower jaw is drawn to the upper with such force that they cannot be separated the disorder is called *lock-jaw* (*trismus*). It frequently terminates fatally. See *Anti-toxin*, *Trismus*.

Tête-du-pont (tât-dû-pon), in fortification, a work that defends the head or entrance of a bridge nearest the enemy.

Tetrabranchia'ta, an order of Cephalopoda or cuttle-fishes, having four branchiæ or gills, comprising the two families Nautilidæ and Ammonitidæ. Of this order the pearly nautilus may be regarded as the type, being the only living member of the order, though its fossil representatives (*Orthoceras*, *Ammonites*, &c.) are abundant. See *Nautilus*.

Tetra'hedron, in geometry, a figure comprehended under four equilateral and equal triangles, or a triangular pyramid having four equal and equi-



lateral faces. It is one of the five regular solids.

Tetra'o. See *Grouse*.

Tetrarch, a title which originally signified the governor of the fourth part of a country. By the Romans the title was used to designate a tributary ruler inferior in dignity to a king.

Tetrastyle, in ancient architecture, having or consisting of four columns, or having a portico consisting of four columns.

Tetuan', a town of Morocco, on the northern coast of Africa, 33 miles south-east of Tangier. It is about $\frac{1}{2}$ mile from the Mediterranean, is surrounded by walls and defended by a castle, and carries on an active trade. The environs are extensively planted with vineyards and gardens. Pop. 25,000.

Tetzel, JOHANN, a man whose name has become infamous in connection with the Reformation, was born about 1470, at Leipzig, where he studied theology. He entered the order of the Dominicans, and in 1502 was appointed by the Roman see a preacher of indulgences, and carried on for fifteen years a very lucrative trade in them. His life was so corrupt that at Innsbruck he was sentenced to be drowned for adultery, but got off through powerful intercession. Having travelled to Rome, he was absolved by Pope Leo X., and now carried on the sale of indulgences with still greater effrontery. Luther came out with his theses against this crying abuse in 1517, with what results we know. (See *Luther*.) Tetzel died of the plague in the Dominican convent at Leipzig in 1519. A great part of the money acquired by his traffic in indulgences was used for the erection of St. Peter's church at Rome.

Teuthis. See *Squid*.

Teutoburg Forest, or **TEUTOBURGER WALD**, a hilly district of Germany, in Westphalia, where Arminius defeated the Roman general Varus A.D. 9. See *Arminius*.

Teutones, a tribe of Germany, which, with the Cimbri, invaded Gaul in B.C. 113. In B.C. 102 they were defeated with great slaughter near Aquæ Sextiæ (Aix in the department of Bouches du Rhône) by the Roman general Marius. A tribe of the same name is mentioned by Pliny and others as inhabiting a district north of the Elbe, which appears to have been the original settlement of the Teutones before their invasion of Gaul. See *Teutonic Peoples*.

Teutonic Knights, a military religious order of knights, established toward the

close of the 12th century, in imitation of the Templars and Hospitallers. It was composed chiefly of Teutons or Germans who marched to the Holy Land in the Crusades, and was established in that country for charitable purposes. In the 13th century they acquired Poland and Prussia, and they long held sway over a great extent of territory in this part of Europe. The order began to decline in the 15th century, and was finally abolished by Napoleon in 1809.

Teutonic Peoples, a term now applied (1) to the High Germans, including the German inhabitants of Upper and Middle Germany and those of Switzerland and Austria. (2) The Low Germans, including the Frisians, the Plattdeutsch, the Dutch, the Flemings, and the English descended from the Saxons, Angles, &c., who settled in Britain. (3) The Scandinavians, including the Norwegians, Swedes, Danes, and Icelanders. See *Philology*, *Indo-European Languages*.

Tewfik Pasha, MAHOMMED, Khedive of Egypt, eldest son of Khedive Ismail, was born in 1852, and succeeded to the vice-royalty by decree of the sultan, Aug. 8, 1879, upon the forced abdication of his father. He was the sixth ruler of Egypt in the dynasty of Mahommed Ali Pasha. He died in 1892. See *Egypt*.

Tewkesbury (tuks-be-ri), a mun. borough of England, in Gloucestershire, where the Avon joins the Severn, giving name to a parl. div. The parish church is a noble pile of building in the Norman style, and one of the largest in England. It is part of the celebrated monastery of Tewkesbury, founded in 715. Pop. 5419.

Texas, the largest of all the United States, bounded by New Mexico, Oklahoma, Arkansas, Louisiana, the Republic of Mexico, and the Gulf of Mexico; length, east to west, 825 miles; breadth, 740 miles; coast-line, 400 miles; area, 265,780 miles. The surface in the north-west is covered with mountains, which, in proceeding south-east, subside into hills and undulating plateaus, succeeded, on approaching the Gulf of Mexico, by low alluvial plains. These extend inland from 20 to 80 miles, are furrowed with deep ravines, and consist for the most part of rich prairie or forest land. The hilly region behind this is formed chiefly of sandstone and limestone ridges, separated by valleys of considerable fertility. In the mountainous region many of the summits are lofty, and covered with snow most of the year. The general slope of the country

gives all the rivers a more or less southerly direction. The Rio-Grande, rising in New Mexico, forms the west and south-west boundary of the state. The Red River, which has its source in Mexico, forms the greater part of the northern boundary. The other important rivers are the Colorado, the Brazos, the San Jacinto and Trinity, and the Sabine, which, during the greater part of its course, is the boundary between Texas and Louisiana. A long chain of lagoons stretches along the Gulf of Mexico. The soil of Texas is, as a whole, extremely fertile. The two staple products are cotton and maize, both of which are largely cultivated in the lower or coast region, where the sugar-cane and tobacco also grow luxuriantly, and rice is an important crop. Wheat, rye, oats, and barley thrive best in the higher regions. The forests contain large tracts of oak. The pastures are often covered with the richest natural grasses, and the rearing of cattle is on a great scale. Manufacture is still in its infancy; but the railway system is very extensive. Petroleum is now obtained in great quantities; coal is mined; and iron, copper, &c., are also obtained. The first settlement in Texas was made at Matagorda by the French, who in 1690 were expelled by the Spaniards. It afterwards became one of the states of the Mexican Confederation. Several colonies of American citizens, invited by the Mexicans, settled in the eastern section, and gradually increased in numbers. Texas then revolted from the Mexican government, and in 1836 declared itself independent. Santa Anna attempted to reduce it, but failed, being himself beaten and taken prisoner at the battle of San Jacinto by General Houston. Texas now managed its own affairs as an independent republic till in 1845 it became one of the United States, and thus gave rise to a war which proved disastrous to Mexico. It joined the Confederates during the civil war, and was the last to submit. It was under military control till 1870, when it was restored to the Union. Austin is the capital, and other chief towns are Galveston, San Antonio, Houston, Dallas, Fort Worth, Waco, &c. Pop. 3,048,826, including about 621,000 coloured.

Texco'co (tes-). Same as *Tezcuco*.

Texel, an island of the province of North Holland, 14 miles in length and 6 in its greatest breadth, situated at the entrance of the Zuyder Zee, and separated from North Holland by the narrow channel of

Mars-Diep. The island furnishes excellent pasture for sheep, and it is noted for cheese made from sheep's milk. It is well secured with dikes of prodigious strength and height. Pop. 6800.

Tezcu'co, a town of Mexico, in the department of Mexico, on the eastern shore of the Lake of Tezcuco. In ancient times it was the second city in the kingdom. Here are the remains of three pyramids, each measuring 400 feet along the base of their fronts. The modern town contains many handsome edifices, and carries on an active trade. Pop. 5000.

Tezel (tet'sl). Same as *Tetzel*.

Thackeray, WILLIAM MAKEPEACE, English novelist and humourist, was born at Calcutta in 1811, died Dec. 24, 1863. His father was in the civil service of the East India Company. At the age of seven Thackeray was sent to England for his education, and was placed at the Charterhouse School, London, afterwards continuing his studies at Cambridge. He left the university without taking a degree; and, being well provided for, he chose the profession of an artist. He spent several years in France, Germany, and Italy, staying at Weimar, Rome, and Paris, but gradually became convinced that art was not his vocation, and having meanwhile lost his fortune, he resolved to turn his attention to literature. His first appearance in this sphere was as a journalist. Under the names of George Fitz-Boodle, Esq., or of Michael Angelo Titmarsh, he contributed to Frazer's Magazine tales, criticisms, verses, &c., which were marked by great knowledge of the world, keen irony, or playful humour. It was in this magazine that *The Great Hoggarty Diamond*, *Yellowplush Papers*, and *Barry Lyndon* appeared. In 1840 he published separately the *Paris Sketch-book*, in 1841 the *Second Funeral of Napoleon* and the *Chronicle of the Drum*, and in 1843 the *Irish Sketch-book*. None of these writings, however, attained to any great popularity. In 1841 *Punch* was started, and his contributions to that periodical, among others *Jeames's Diary* and the *Snob Papers*, were very successful. In 1846-48 his novel of *Vanity Fair* was published in monthly parts, with illustrations by himself; and long before its completion its author was unanimously placed in the first rank of British novelists. His next novel was the *History of Pendenis*, completed in 1850. In 1851 he delivered a course of lectures in London on the

English Humourists of the 18th Century, which were repeated in Scotland and America, and published in 1853. Another novel, *The History of Henry Esmond* appeared in 1852, and was followed by *The Newcomes* (1855), *The Virginians* (1859), a sort of sequel



William Makepeace Thackeray.

to *Esmond*; *Lovel the Widower*, *The Adventures of Philip*, and *Denis Duval*, which was left unfinished at his death. In 1855-56 he delivered a series of lectures in the United States—*The Four Georges*, and afterwards in England and Scotland. In 1859 he became editor of the *Cornhill Magazine*, in which his later novels and the remarkable *Roundabout Papers* appeared, but he retired from that post in 1862. He wrote a good deal of verse, half-humorous, half-pathetic, and often wholly extravagant, but all characterized by ease and spontaneity. He undoubtedly ranks as the classical English humourist and satirist of the Victorian reign, and one of the greatest novelists, essayists, and critics in the literature. A collection of letters by Thackeray was published in 1887.—His daughter, ANNE ISABELLA (wife of Sir Richmond Thackeray Ritchie), born 1838, inherited much of her father's literary talent. In 1860 she contributed to the *Cornhill Magazine* *Little Scholars in the London Schools*, which was followed by *The Story of Elizabeth*, and *The Village on the Cliff*. Old Kensington (1873) is probably the fiction by which she will be best known. Other works are *Blue Beard's Keys*, *Toilers and Spinners*, *Miss Angel*, and *Mrs. Dymond*.

Thalamifloræ, a class of exogenous or dicotyledonous plants in which the petals are distinct and inserted with the stamens on the thalamus or receptacle.

Thalberg (täl'berh), SIGISMUND, a celebrated pianist, was born in Geneva in 1812, received his first instruction on the pianoforte in Vienna, and already as a boy was famous as a performer. Towards the end of 1835 he went to Paris, where he at once established his fame. He subsequently visited England, the Netherlands, Russia, and Italy, being everywhere received with the greatest enthusiasm. During the years from 1865 to 1868 he visited Brazil and the United States, and after several years retirement on an estate he had purchased near Naples, he once more visited Paris and London (1862), and later Brazil. He died April 28, 1871. He left a number of compositions, including sonatas, studies, a concerto, several nocturnes, and other small pieces.

Thaler (tä'ler), a silver coin formerly in use in Germany, of the value of about 3s. See *Dollar*.

Thales (thä'lez), a native of Miletus in Ionia, or, according to some, of Phœnicia, the earliest philosopher of Greece, and the founder of the Ionian school, was born about 640 B.C. He is said to have made several visits to Egypt, where he received instructions from the priests, from whom he probably acquired a knowledge of geometry. After his return his reputation for learning and wisdom became so great that he was reckoned among the seven wise men, and his sayings were held in the highest esteem by the ancients. He died about B.C. 548. His philosophical doctrines were taught orally, and preserved only by oral tradition, until some of the later Greek philosophers, particularly Aristotle, committed them to writing. He considered water, or rather fluidity, the elemental principle of all things. His philosophical doctrines are, however, but imperfectly understood.

Thali'a, one of the nine Muses. She was the patron of comedy, and is usually represented with the comic mask and the shepherd's crook in her hand. One of the Graces was also called Thalia.

Thallium (from Gr. *thallos*, a green twig), a metal discovered by Crookes in 1861, in a deposit from a sulphuric acid manufactory in the Hartz. In its physical properties thallium resembles lead, but is slightly heavier, somewhat softer, and may be scratched by the finger-nail. It melts at 290° Cent., and is soluble in the ordinary mineral acids. In colour it resembles silver, but is less brilliantly white. Its specific gravity varies from 11.8 to 11.9, according to the

THALLOGENS—THANET.

mechanical treatment to which it has been subjected. The tenacity of the metal is less than that of lead; it is possessed of very considerable malleability. Thallium and its salts impart an intense green colour to a non-luminous flame; when a flame so coloured is examined by the spectroscope one very brilliant green band is noticed, somewhat more refrangible than the sodium line D. (See *Spectrum*.) The salts of thallium are exceedingly poisonous. The symbol adopted for this metal is Tl, and the atomic weight 204.1. It forms two oxides, Tl_2O , and Tl_2O_3 , giving rise respectively to *thalous* and *thallio* salts. Small quantities of thallium are widely distributed in nature, the metal frequently occurring in iron and copper pyrites, in native sulphur, &c.

Thallogens, one of the primary divisions of the vegetable kingdom, comprehending those cryptogamous plants which are extremely simple in their structure, and possess nothing like the green leaves of phanerogamous plants. They have no woody fibre properly so called, being mere masses of cells. Thallogens include algæ, characeæ, fungi, and lichens.

Thallus, in botany, a solid mass of cells, or cellular tissue without woody fibre, consisting of one or more layers, usually in the form of a flat stratum or expansion, or in the form of a lobe, leaf, or frond, and forming the substance of the thallogens.



Lichen—*Parmelia pityrea*,
Thallus.

Thames (temz), the most important river of Great Britain, is usually said to rise about 3 miles south-west of Cirencester in Gloucestershire, near a bridge over the Thames and Severn Canal, called Thameshead Bridge, but is more properly formed by the Isis, Churn, Colne, and Leach, which have their sources on the east side of the Cotswold Hills, and unite near Lechlade, where the counties of Gloucester, Wilts, Berks, and Oxford border on each other. Proceeding from Lechlade, where it becomes navigable for barges, it flows first E.N.E., then S.S.E., past Oxford and Abingdon to Reading, then north-west past Great Marlow, and south-east past Windsor to Staines. From Staines it pursues a circuitous course eastward, passing the towns of Chertsey, King-

ston, Richmond, and Brentford, separating the counties of Middlesex and Surrey, and passing through London. Below London its course eastward to the Nore, between Kent and Essex, is 47 miles. Its total course is estimated at 250 miles. Its tributaries include the Windrush, Cherwell, Thame, Colne, Brent, Lea, and Roding, on the left; the Kennet, Loddon, Wey, and Mole, on the right. Thameshead Bridge is 376 feet above sea-level; the junction of the Colne above Lechlade is 243 feet. At London Bridge the width of the river is 266 yards, at Woolwich 490 yards, at Gravesend 800 yards, and 3 miles below, 1290 yards. The basin of the Thames has an area of 5400 square miles. Vessels of 800 tons can reach St. Katherine's Docks, of 4000 tons Blackwall, but dredging is required to preserve a fairway for the larger vessels. Great schemes are spoken of to give improved shipping facilities; greater depth of water in particular being required for the huge ships now built. The tide ascends to Teddington. (See also *London*.) By means of canals access is given from its basin to those of all the great rivers of England.

Thana, TANNA, chief town of a district of the same name, Bombay Presidency, 21 miles north-east of Bombay city. It is a favourite residence with the Bombay officials. Pop. 16,000.—The district has an area of 4243 sq. miles. Pop. 809,361.

Thane, a title of honour among the Anglo-Saxons. In England a freeman not noble was raised to the rank of a thane by acquiring a certain portion of land—five hides for a lesser thane—by making three sea-voyages, or by receiving holy orders. Every thane had the right of voting in the witenagemot, not only of the shire, but also of the kingdom, when important questions were to be discussed. With the growth of the kingly power the importance of the king's thanes (those in the personal service of the sovereign) rose above that of the highest gentry, ealdormen and bishops forming an inferior class. On the cessation of his actual personal service about the king the thane received a grant of land. After the Norman conquest thanes and barons were classed together. In the reign of Henry II. the title fell into disuse. In Scotland the thanes were a class of non-military tenants of the crown, and the title was in use till the end of the 15th century.

Than'et, ISLE OF, a parl. div. of England in the county of Kent, at the mouth of the

THANN — THEATRE.

Thames, separated from the mainland by the river Stour on the south and the rivulet Nethergong on the west, with an area of 26,500 acres. The soil is dry, the air pure and bracing, and the surface consists of rich and highly cultivated land. The chief towns are Margate, Ramsgate, and Broadstairs, all frequented for sea-bathing. Pop. 71,631.

Thann (tân), a manufacturing town of Germany, in Alsace, on the Thur where it issues from the Vosges. It stands at the foot of a hill crowned by the ruins of the old castle of Engelburg, contains a magnificent Gothic church with a spire of open work 328 feet high, and has manufactures of woollens, cottons, &c. Pop. 7462.

Thar and Parkar, British district in the east of Sind, Bombay Presidency, between Khairpur and the Rann of Cutch. It is divided into two districts, the 'Pat' or plain of the Eastern Nara, and the 'Thar' or desert. Area, 12,729 sq. miles; pop. 363,900. Scarcely a half of the area is under cultivation. Chief town, Umarkot, the birthplace of Akbar.

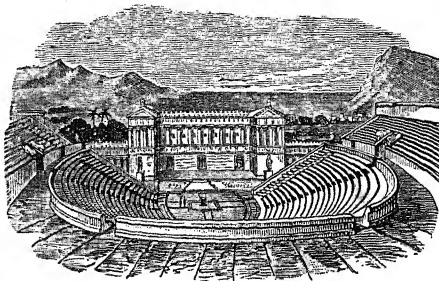
Thaso, the ancient *Thasos*, an island in the Aegean Sea, a few miles south of the Macedonian coast, belonging to Turkey. It is of a circular form, about 16 miles in diameter, and is traversed by high woody hills, which yield quantities of timber. It is under an Egyptian governor. Pop. 12,000.

Thea, the tea genus of plants. See *Tea*.

The atines, an order of monks founded at Rome in 1524, principally by Gianpietro Caraffa (Pope Paul IV.), archbishop of Chieti, in Naples (anciently *Theate*). They bound themselves to preach against heretics, attend the sick and criminals, and not to possess property or ask for alms. The order formerly flourished in France, Spain, and Portugal, but its influence is now chiefly confined to the Italian provinces.

Theatre (Greek, *theatron*), an edifice appropriated to the representation of dramatic spectacles. Among the Greeks and Romans theatres were the chief public edifices next to the temples, and in point of magnitude

they surpassed the most spacious of the temples, having in some instances accommodation for as many as from 10,000 to 40,000 spectators. The Greek and Roman theatres very closely resembled each other in their general form and principal parts. The building was of a semicircular form, resembling the half of an amphitheatre, and was not covered by a roof. In Greece the semicircular area was often scooped out in the side of a hill, but Roman theatres were built on the level. The seats of the spectators were all concentric, being arranged in tiers up the semicircular slope. The stage or



Theatre of Segesta, Sicily—restored.

place for the players was in front of the seats, being a narrow platform along the straight side of the theatre. Behind this rose a high wall resembling the façade of a building, this being intended to represent any building in front of which the action was supposed to take place. This was called in Greek *skênê* (L. *scena*), the stage being called *proskênion* (L. *proscenium*). The semicircular space between the stage and the lowest seats of the spectators was called *orchestra*, and was appropriated by the Greeks to the chorus and musicians, and by the Romans to the senators. Scenery, in the modern sense of the word, was not employed except in a very rude form, but the stage machinery seems in many cases to have been elaborate; and in particular there was a well-known machine or contrivance of some sort from which deities made their entrance as if from the sky. A good example of an ancient theatre is that of Segesta in Sicily.

Between the decline of the ancient and the rise of the modern drama there is a long interval, in which the nearest approach to theatrical entertainments is found in miracle plays, mysteries, and interludes. These performances took place in churches, convents, halls, &c., or in the open air. In 1548 the Confraternity of the Trinity opened a theatre in Paris, in which they performed secular pieces. The first theatre erected in Italy seems to have been that of Florence

built in 1581, but the first building that approaches the modern style was one constructed at Parma in 1618. In England there were organized companies of actors as far back as the time of Edward IV., but as there were no regular playhouses the performances took place in tennis-courts, inn-yards, and private houses. The London Theatre was built before 1576, and the Curtain in Shoreditch and the playhouses in Blackfriars and Whitefriars date from about the same time. Shakspeare's plays were brought out at the house in Blackfriars and at the Globe on the Bankside, both of which belonged to the same company, to whom James I. granted a patent in 1603. The Globe was a six-sided wooden structure, partly open at the top and partly thatched. Movable scenery was first used on the public stage by Davenant in 1662, and about the same time this manager introduced women to play female characters, hitherto taken by boys and men. Modern theatres are all very much alike in their internal construction. The house is divided into two distinct portions, the auditorium and the stage, the former for the spectators, the latter for the actors and scenery, which is often of the most elaborate and realistic kind. The floor of the auditorium is always sloped down from the back of the house to the stage; several tiers of galleries or balconies run in a semicircular or horseshoe form round the house. On the ground-floor the front rows of seats are generally reserved as dress or orchestral stalls, and the back part is called the pit. The seats in the galleries rise terrace-wise from the front, so as to allow the persons in the back rows to see on to the stage over the heads of those before them. Immediately in front of the stage is a space occupied by the orchestra. Part of the stage flooring is movable, either as traps through which actors or furniture ascend or descend, or in long narrow pieces which are drawn off at each side of the stage to allow the passage of the rising scenes. Adjoining the stage are the dressing-rooms for the performers, the green-room where they wait when dressed, &c.

Theatres in Great Britain are regulated by the act 6 and 7 Vict. cap. lxxviii., which provides that no person shall keep open any house for the public performance of stage-plays without the authority of letters-patent or of license from the lord-chamberlain or the justices of the peace, under the

penalty of a sum not exceeding £20 for every day such house shall have been kept open without a license. The Local Government Act of 1888 transferred the licensing power of the English justices to the County Councils. The license in all cases is only to be granted to the actual and responsible manager for the time being, who must give surety for the observance of the rules respecting theatres. The lord-chamberlain and the licensing authorities within their respective districts may suspend any license in cases of riot or misbehaviour, or order the theatres to be closed on any public occasion. No new play or addition to an old one may be acted till copies have been deposited with the lord-chamberlain seven days before the intended representation, and an offence against this rule is punishable with a fine not exceeding £50. The theatres of the British colonies and the United States of America are as a rule licensed and regulated by the municipal corporations.

Thebes (thēbz), an ancient capital of Egypt, in Upper Egypt, on both sides of the Nile, about 300 miles s.s.e. of Cairo, now represented by the four villages of Luxor, Karnak, Medinet Habu, and Kurneh, as well as by magnificent ruins, which extend about 9 miles along the river. When Thebes was founded is not known; the period of its greatest prosperity reaches from 1500 to 1000 B.C. The ruins comprise magnificent temples, rock-cut tombs, obelisks decorated with beautiful sculptures, long avenues of sphinxes, and colossal statues. The largest of the temples is that at Karnak, which is about 1½ mile in circumference. The great hall of the temple (or 'hall of columns;' see *Egypt*, section *Architecture*), the most magnificent in Egypt, measures 329 feet by 170, and the roof was originally supported by 134 gigantic columns, of which 12 forming the central avenue are 62 feet high and 11 feet 6 inches in diameter, the others, which are in rows on either side, being fully 42 feet in height and 28 in circumference. Within the temple courts are several obelisks of red granite; one—the largest obelisk known—is 108 feet 10 inches high and 8 feet square. Above Karnak are the village and temple of Luxor, the latter at one time connected with Karnak by an avenue of sphinxes (some of which still remain) about a mile long. The Memnonium or temple of Rameses II., and the temple and palace of Rameses III., on the other or left bank of the river, are objects of

THEBES.—THEOCRITUS

great interest, both for the grandeur of their architecture and the richness and variety of their sculptures. (For plan of former see *Egypt*.) Here are also the colossal statues of Amenoph III., one of them known as the vocal statue of Memnon (which see). In the interior of the mountains which rise behind are found the tombs of the kings of Thebes, excavated in the rock, the most remarkable being that of Sethi I., discovered by Belzoni, and containing fine sculptures and paintings.

Thebes, a city of ancient Greece, the principal city of Boeotia, the birthplace of Pindar, Epaminondas, and Pelopidas, was situated about midway between the Corinthian Gulf and the Euboean Sea. Cadmus is said to have founded it in 1500 B.C. It lost much of its influence in Greece through its perfidious leagues with the Persians. Under the brilliant leadership of Epaminondas and Pelopidas it became the leading state in Greece, but its supremacy departed when the former fell at the battle of Mantinea (B.C. 362). From this time the city never recovered its former importance, and gradually disappeared from history. The modern Thebes or Thiva is an unimportant town of some 4000 inhabitants.

Theca, in botany, the spore-case of ferns, mosses, &c.

Theft. See *Larceny*.

The'ine. See *Caffeine*.

Theism, the belief or acknowledgment of the existence of God, as opposed to *Atheism*. See *Deism*.

Theiss (tis), a river of Hungary, formed in the east of the kingdom by the junction of the Black and the White Theiss, both descending from the Carpathians and flowing into the Danube about 20 miles above Belgrade; length, about 800 miles. It is the second river in Hungary, being inferior only to the Danube, with which, for about 100 miles, the lower part of its course is almost parallel. Its principal tributary is the Maros from the east.

Themis, goddess of law and justice among the Greeks, was the daughter of Urānus and Gæ (Heaven and Earth); according to some, of Helios, or the Sun.

Themis'tocles (-klez), an Athenian commander, born 514 B.C. On the second invasion of Greece by Xerxes, Themistocles succeeded by bribery in obtaining the command of the Athenian fleet, and in the battle of Salamis which followed (B.C. 480), the Persian fleet was almost totally destroyed, and Greece

was saved. The chief glory of the victory is due to Themistocles. Subsequently he was accused of having enriched himself by unjust means,

and of being privy to designs for the betrayal of Greece to the Persians. Fearing the vengeance of his countrymen, he, after many vicissitudes, took refuge at the Persian court. The Persian throne was now (465 B.C.) occupied by Artaxerxes Longimānus, to whom Themistocles procured access, and whose favour he gained by his address and talents, so that he was treated with the greatest distinction. He died in 449, according to some accounts by his own hand.



Themistocles.

The'obald (often pronounced tib'ald), LEWIS, English writer, born about 1690, was brought up to the profession of the law, but early turned his attention to literature, and wrote some plays, now quite forgotten. Pope was meanly jealous of him, and ridiculed him in his *Dunciad*. Theobald, however, had his revenge, his edition of Shakspeare (1733) completely supplanting Pope's. He did great service to literature by this painstaking work, many of his emendations having been adopted by subsequent editors. He died in 1744.

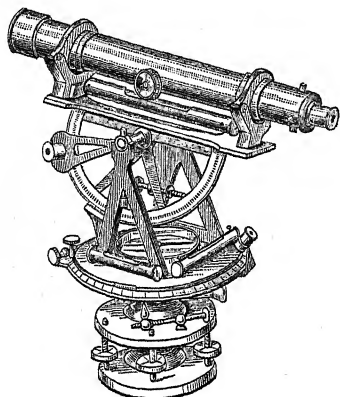
Theobro'ma. See *Cacao*.

Theoc'racy is that government of which the chief is, or is believed to be, God himself, the priests being the promulgators and expounders of the divine commands. The most notable theocratic government of all times is that established by Moses among the Israelites.

Theoc'ritus, a Greek poet, born at Syracuse, who flourished about B.C. 280. We have under his name thirty idyls, or pastoral poems, of which, however, several are probably by other authors. Most of his idyls have a dramatic form, and consist of the alternate responses of musical shepherds. His language is strong and harmonious.

THEODOLITE—THEODORIC.

Theod'olite, a surveying instrument for measuring horizontal and vertical angles by means of a telescope the movements of which can be accurately marked. This instrument is variously constructed, but its main characteristics continue unaltered in



Theodolite.

all forms. Its chief features are the telescope, a graduated vertical circle to which it is attached, two concentric horizontal circular plates which turn freely on each other, and two spirit-levels on the upper plate to secure exact horizontality, the whole being on a tripod stand. The lower plate contains the divisions of the circle round its edge, and the upper or vernier plate has two vernier divisions diametrically opposite. The plates turn on a double vertical axis. To measure the angular distance horizontally between any two objects, the telescope is turned round along with the vernier circle until it is brought to bear exactly upon one of the objects; it is then turned round until it is brought to bear on the other object, and the arc which the vernier has described on the graduated circle measures the angle required. By means of the double vertical axis the observation may be repeated any number of times in order to ensure accuracy. The graduated vertical circle is for taking altitudes or vertical angles in a similar way. The theodolite is a most essential instrument in surveying and in geodetical operations.

Theodo'ra, the wife of the Byzantine emperor Justinian, of low birth, at one time a dancer on the stage, and notorious

for licentiousness. She latterly assumed the character of a pious benefactor of the church, and died in 548, aged forty. See *Justinian I.*

Theodore, one of the most distinguished ecclesiastical writers of his age, born at Antioch about the middle of the 4th century. Early in life he followed the example of Chrysostom in embracing the monastic life. He was ordained priest, and for fifty years distinguished himself as a zealous opponent of the heresies of Arius, Apollinarius, and others. From Antioch he removed to Tarsus, and in the year 392 or 394 was chosen bishop of Mopsuestia in Cilicia, dying in 429. Only a few fragments of his works are extant, the most important of them being commentaries on almost all the books of the Bible, and various polemical treatises. His doctrine approximated somewhat to that of Pelagius, and was later considered heretical.

Theodore II., King of Abyssinia, born in the province of Kwara in 1818, for many years a rebel, finally fought his way to the throne (1855). He was a man of great parts, an inveterate foe of Islamism, a born ruler, and an intelligent reformer. But intolerance of any power save his own finally made a tyrant of him; and in consequence of the imprisonment of Consul Cameron and other British subjects he brought upon himself a war with England, which ended, April 13, 1868, in the storming of Magdala and the death (supposedly by suicide) of Theodore. See *Abyssinia*.

Theod'oret, a distinguished ecclesiastical historian and theological writer, born at Antioch about the close of the 4th century, and in 420 or 423 raised to the bishopric of Cyrus or Cyrrhus. Becoming involved later in the quarrel between Nestorius and the overbearing and intolerant Cyril of Alexandria, he was deposed at the so-called robber council of Ephesus, a sentence which was reversed by the general council of Chalcedon in 451. Theodoret appears to have died in 457 or 458. The most important of his works consist of commentaries on numerous books of the Old Testament and on the Pauline epistles; *Ecclesiastical History*, *History of Heresies*, &c.

Theodor'ic, King of the Ostrogoths, born A.D. 455, died 526, was the son of Theodemir, king of the Ostrogoths of Pannonia. From his eighth to his eighteenth year he lived as a hostage with the Emperor Leo at Constantinople. Two years after his return

he succeeded to the throne. In 493, after several bloody engagements, Theodoric induced Odoacer, who had assumed the title of King of Italy, to grant him equal authority. The murder of Odoacer at a banquet soon after opened the way for Theodoric to have himself proclaimed sole ruler. Theodoric ruled with great vigour and ability. He attached his soldiers by assigning them a third part of the lands of Italy, on the tenure of military service; while among his Italian subjects, whom he conciliated by introducing an improved administration of justice, he encouraged industry and the arts of peace. Although, like his ancestors, he was an Arian, he never violated the peace or privileges of the Catholic Church.

Theodosius, a Christian Roman emperor, born in Spain about 346, and selected by the Emperor Gratian, in 379, for his partner in the empire. To his care were submitted Thrace and the eastern provinces, which he delivered from an invasion of the Goths, concluding a peace with them in 382. On the defeat and death of Maximus (388) he became the sole head of the empire, Gratian having been previously killed in the war against Maximus. In 390 a sedition took place in Thessalonica, and to satisfy his vengeance Theodosius caused the people of the city to be invited to an exhibition at the circus, and when a great concourse had assembled they were barbarously murdered by his soldiery, to the number, it is computed, of 7000. St. Ambrose refused him communion for eight months on account of this crime, and Theodosius submitted humbly to the punishment. He died at Milan A.D. 395, leaving the eastern portion of the empire to his son Arcadius, the western to his son Honorius. He distinguished himself by his zeal for orthodoxy, and his intolerance and persecution of Arianism and other heresies.

Theology (Greek *Theos*, God, and *logos*, doctrine) is the science which treats of the existence of God, his attributes, and the Divine will regarding our actions, present condition, and ultimate destiny. In reference to the sources whence it is derived theology is distinguished into *natural* or *philosophical* theology, which relates to the knowledge of God from his works by the light of nature and reason; and *supernatural*, *positive*, or *revealed* theology, which sets forth and systematizes the doctrines of the Scriptures. With regard to the contents of

theology it is classified into *theoretical* *theology* or *dogmatics*, and practical theology or ethics. As comprehending the whole extent of religious science, theology is divided into four principal classes, *historical*, *exegetical*, *systematic*, and *practical* *theology*. Historical theology treats of the history of Christian doctrines. Exegetical theology embraces the interpretation of the Scriptures and Biblical criticism. Systematic theology arranges methodically the great truths of religion. Practical theology consists of an exhibition, first, of precepts and directions; and secondly, of the motives from which we should be expected to comply with these. *Apologetic* and *polemic* theology belong to several of the above-mentioned four classes at once. The *Scholastic* *theology* attempted to clear and discuss all questions by the aid of human reason alone, laying aside the study of the Scriptures, and adopting instead the arts of the dialectician.

Theophrastus, a celebrated Peripatetic philosopher, was born at Lesbos early in the 4th century B.C., and studied at Athens, in the school of Plato, and afterwards under Aristotle, of whom he was the favourite pupil and successor. On the departure of Aristotle from Athens after the judicial murder of Socrates he became the head of the Peripatetic school of philosophy, and composed a multitude of books — dialectic, moral, metaphysical, and physical. We possess two entire works of his on botany, but only fragments of his other works, such as those on Stones, on the Winds, &c.; and his Characters or sketches of types of character, by far the most celebrated of all his productions. He died in 287 B.C. To his care we are indebted for the preservation of the writings of Aristotle, who, when dying, intrusted them to his keeping.

Theophrastus Paracelsus. See *Paracelsus*.

Theosophy, according to its etymology the science of divine things. But the name of *theosophists* has generally been applied to persons who in their inquiries respecting God have run into mysticism, as Jacob Böhme, Swedenborg, St. Martin, and others. At the present day the term is applied to the tenets of the Theosophical Society, founded in New York in 1875 by a Col. Olcott, the objects of which are: to form the nucleus of a universal brotherhood of humanity, to promote the study of Eastern literature and science, and chiefly to investigate unexplained laws of nature, and the

THERA—THERMO-ELECTRICITY.

psychical powers of man, and generally the search after divine knowledge—divine applying to the divine nature of the abstract principle, not to the quality of a personal God. The theosophists assert that humanity is possessed of certain powers over nature, which the narrower study of nature from the merely materialistic stand-point has failed to develop. Leading names are Olcott, A. P. Sinnett, Madame Blavatsky, and Mrs. Annie Besant. Their so-called occult manifestations are akin to those attributed to spiritualism or telepathy, that is, communication between minds at a distance from each other.

Thera. See *Santorin*.

Therapeu'tæ, a Jewish sect of devotees of the 1st century after Christ. They withdrew into solitary places, where they devoted themselves to a life of religious contemplation, and to them with the Essenes the origin of monasticism in the Christian church has been traced.

Therapeutics, that department of medicine which treats of remedies in the widest sense.

There'sa, St., a religious enthusiast, born at Avila, in Spain, in 1515, who took the veil among the Carmelites at the age of twenty-four. Being dissatisfied at the relaxation of discipline in the order to which she belonged she undertook to restore the original severity of the institute. The first convent of reformed Carmelite nuns was founded at Avila in 1562, and was speedily followed by a number of others. She died in 1582, and was canonized by Pope Gregory XV. in 1621. She was the author of several works, all of a devotional nature, among them a very curious life of herself.

Theresio'pel, or **MARIA-THERESIENSTADT** (Hung. *Szabadka*), a royal free town in Hungary, in the county of Bács, is more properly a district than a town, as it covers, with its numerous suburbs, an area of more than 600 square miles. It has manufactures of linen and woollen cloth, dye-works, tanneries, soap-boiling works, &c., and a trade in cattle, horses, hides, and wool. Pop. 81,302.

Thermæ, a name often given to the large bathing establishments of ancient Rome.

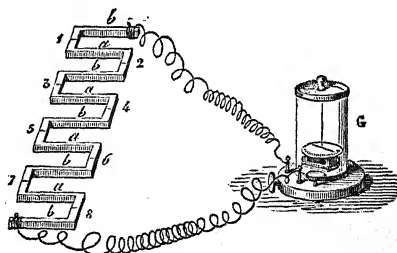
Thermidor, the eleventh month of the year in the calendar of the first French republic. It commenced on the 19th of July, and ended on the 17th of August. See *Calendar*.

Thermodynam'ic Engine, any form of heat engine (as gas or steam engines) by

means of which a percentage of the heat lost by one body called the source, on account of its connection with another body called the refrigerator, is converted into kinetic energy or mechanical effect, and made available for the performance of work. The efficiency of a heat engine is the ratio of the heat available for mechanical effect to the total heat taken from the source. A reversible engine is called a perfect engine, because it is the most efficient engine between the temperatures of its source and refrigerator.

Thermodynam'ics, that department of physical science which investigates the laws regulating the conversion of heat into mechanical force or energy, and vice versa.

Thermo-electricity, electricity produced at the junction of two metals, or at a point where a molecular change occurs in a bar of the same metal, when the junction or point is heated above or cooled below the general temperature of the conductor. Thus when wires or bars of metal of different kinds, as bismuth and antimony, are placed in close contact, end to end, and disposed so as to form a periphery or continuous circuit, and heat then applied to the ends or junctions of the bars, electric currents are produced. The principle of the arrangement is



shown in the accompanying figure, in which the bars marked *a* are antimony, those marked *b* bismuth. The junctions 1, 3, 5, 7 are to be at one temperature, the junctions 2, 4, 6, 8 at another. *G* is a delicate galvanometer which measures the force of the current produced. The thermo-electric battery, or pile, an apparatus much used in delicate experiments with radiant heat, consists of a series of little bars of antimony and bismuth (or any other two metals of different heat-conducting power), having their ends soldered together and arranged in a compact form; the opposite ends of the pile being

THERMOMETER.

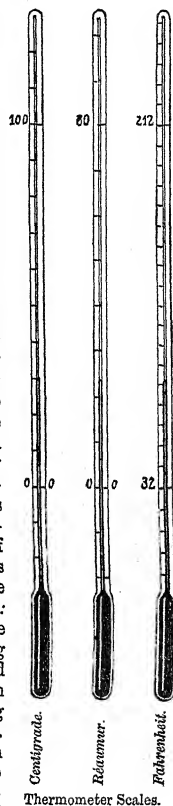
connected with a galvanometer, which is very sensibly affected by the electric current induced in the system of bars when exposed to the slightest variations of temperature. To the combined arrangement of pile and galvanometer the name of *thermo-multiplier* is given. Two metal bars of different heat-conducting power having their ends soldered together, and the combined bar then usually bent into a more or less horse-shoe or magnet form for the purpose of bringing their free ends within a conveniently short distance, designated a thermo-electric pair, are much used in thermo-electric experiments. But as the electric current developed in a single pair is very weak, a considerable number are usually combined to form a thermo-electric pile or battery. Bismuth and antimony are the metals usually employed, the difference in electro-motive force being greater between them than between any other two metals conveniently obtainable.

Thermom'eter, an instrument by which the temperatures of bodies are ascertained; founded on the property which heat possesses of expanding all bodies, the rate or quantity of expansion being supposed proportional to the degree of heat applied, and hence indicating that degree. The thermometer consists of a slender glass tube, with a small bore, containing in general mercury or alcohol, which expanding or contracting by variations in the temperature of the atmosphere, or on the instrument being brought into contact with any other body, or immersed in a liquid or gas which is to be examined, the state of the atmosphere, the body, liquid, or gas, with regard to heat, is indicated by a scale either applied to the tube or engraved on its exterior surface. The ordinary thermometer consists of a small tube, terminating in a ball containing mercury, the air having been expelled and the tube hermetically sealed. A scale of temperatures is attached, in which there are two points corresponding to fixed and determinate temperatures, one, namely, to the temperature of freezing water, and the other to that of boiling water. In the thermometer commonly used in Britain and her colonies, the United States, &c., known as Fahrenheit's thermometer, the former point is marked 32° and the latter 212°; hence the zero of the scale, or that part marked 0°, is 32° below the freezing-point, and the interval or space between the freezing and boiling points consists of 180°. The zero

point is supposed to have been fixed by Fahrenheit at the point of greatest cold that he had observed, probably by means of a freezing mixture such as snow and salt.

In France and other parts of Europe, and nowadays in all scientific investigations, the Centigrade or Celsius scale is used. In this the space between the freezing and boiling points of water is divided into 100 equal parts or degrees, the zero being at freezing and the boiling-point marked 100°. Réaumur's thermometer, in use in Germany, has the space between the freezing and boiling points divided into 80 equal parts, the zero being at freezing. The following formulæ will serve to convert any given number of degrees of Fahrenheit's scale into the corresponding number of degrees on Réaumur's and the Centigrade scales, and *vice versa*:

let F, R, and C (the 0° of C. and R. being equal to F. 32°, and the three scales from freezing to boiling point being F. 180°, C. 100°, R. 80°, or in the ratio of 9, 5, 4) represent any corresponding numbers of degrees on the three scales respectively, then: $(F. - 32°) \times \frac{5}{9} = R.$; $(F. - 32°) \times \frac{5}{9} = C.$; $R. \times \frac{9}{5} + 32° = F.$; $C. \times \frac{9}{5} + 32° = F.$; $C. \times \frac{4}{5} = R.$; $R. \times \frac{5}{4} = C.$ For extreme degrees of cold, thermometers filled with spirit of wine must be employed, as no degree of cold known is capable of freezing that liquid, whereas mercury freezes at about 39° below zero on the Fahrenheit scale. On the other hand, spirit of wine is not adapted to high temperatures, as it is soon converted into vapour, whereas mercury does not boil till its temperature is raised to 660° F. As the ordinary thermometer gives the temperature



only at the time of observation, the necessity for having an instrument which would show the maximum and minimum temperatures within a given period is easily apparent in all cases connected with meteorology, and various forms of instruments for this purpose have been invented. A common form of *maximum thermometer* consists of the ordinary thermometer fitted with a piston which moves easily in the tube. The instrument is placed horizontally, and the piston is pushed along the bore as the mercury advances, and is left at the highest point by the retiring fluid. This point is noted by the observer, who then erects the thermometer, causing the piston to sink to the mercury, the instrument thus being in condition for a fresh experiment. A similar action takes place in the spirit of wine *minimum thermometer*, the small movable piston being, however, immersed in the fluid and drawn back by the convex surface of the contracting fluid, being left at the point of greatest contraction. The maximum and minimum instruments combined form the *self-registering thermometer*.

Thermo-pile. See *Thermo-electricity*.

Thermopylae, a narrow defile in Northern Greece, leading from Thessaly southward, between Mount Eta and the sea (the Malian Gulf, now the Gulf of Zeitouni), 25 miles north of Delphi, celebrated for its defence by 300 Spartans, together with allies, under Leonidas, against the Persian host under Xerxes, in 480 B.C.

Theseus (thē'stūs), a mythical king of Athens and famous hero of antiquity, son of Ægeus by Æthra, the daughter of Pittheus of Troezen, in Peloponnesus, of whom many notable deeds are related, as the slaying of the Minotaur and the freeing of Athens from the tribute of seven youths and seven maidens annually sent to Crete to be devoured by that monster. As king of Athens he is reputed to have governed with mildness, instituted new laws, and made the government more democratic.

Thespis, a native of a village near Athens, who lived in the 6th century B.C., reputed to be the inventor of tragedy and of the masks which the Greek actors always wore in performing. His first representation took place in 535 B.C. See *Drama*.

Thessalonians, EPISTLES TO THE, two New Testament epistles written by St. Paul to the church at Thessalonica, in all probability during his long stay at Corinth, and therefore not very long after the foundation of the

Thessalonian church on St. Paul's second missionary journey. A note at the end of each of the epistles in our Authorized Version states that they were written from Athens, but there can be little doubt that this is erroneous, and that they were really written at Corinth. They are the earliest of Paul's writings, and are characterized by great simplicity of style as compared with his other epistles. The genuineness of the first epistle has hardly ever been questioned, but according to the newer criticism, that of the second epistle is more than doubtful.

Thessalonica. See *Salonica*.

Thes'saly, the north-eastern division of Greece, mainly consisting of a rich plain enclosed between mountains and belonging almost entirely to one river basin, that of the Peneios (Salambria), which traverses it from west to east, and finds an outlet into the Ægean through the vale of Tempe. In the earliest times Thessaly proper is said to have been inhabited by Æolic and other tribes. Subsequently it was broken up into separate confederacies, and seldom exerted any important influence on the affairs of Greece generally. Thessaly was conquered by Philip of Macedon in the 4th century B.C., became dependent on Macedonia, and was finally incorporated with the Roman Empire. After the fall of the Byzantine Empire it came, with the rest of the imperial dominions, into the hands of the Turks, and till recently formed a part of the Ottoman Empire, although the majority of the inhabitants are Greeks. The greater portion of it was in 1881 incorporated with the kingdom of Greece. Capital Larissa. Pop. 397,459.

Thetford, a municipal borough of England, partly in the county of Suffolk and partly in that of Norfolk, on both banks of the Ouse, here crossed by a handsome iron bridge. Pop. 4613.

Thetis, a Greek divinity, a daughter of Nereus and Doris, therefore one of the Nereids. By Peleus, to whom she was married, she became the mother of Achilles.

Thian-shan (tē'an-), or **CELESTIAL MOUNTAINS**, an extensive range of Central Asia, stretching from west to east from the Pamir plateau into the Desert of Gobi, forming in the west a barrier between the Russian and Chinese dominions. Its length is estimated at 1500 miles, and many of its summits rise to 16,000 or 17,000 feet, far beyond the limits of perpetual snow. The highest appears to be Khan-Tengri, 24,000 feet. They present numerous indications of volcanic agency.

Thibet (ti-bet'). See *Tibet*.

Thick-knee. See *Stone-plover*.

Thielt, a town of Belgium, province of West Flanders, 14 miles S.S.E. of Bruges, with manufactures of linens, cottons, woollens, lace, &c. Pop. 10,576.

Thierry (ti-er-ri), JACQUES NICOLAS AUGUSTIN, French historian, born at Blois in 1795, died in 1856. He was for some time associated as secretary and coadjutor with St. Simon, whose socialistic views he embraced. In 1816 he published a treatise entitled *Des Nations et de leurs Rapports Mutuels*. He did not fail to perceive the theoretical vagaries of his master, from whom he separated in 1817. His celebrated work on the Norman conquest of England was published at Paris in 1825, and attained great success both in France and in England. *Lettres sur l'Histoire de la France* appeared in 1827. In 1834 he published, under the title of *Dix Ans d'Etudes*, a series of admirable essays, and about the same time he was summoned by Guizot, then minister of public instruction, to Paris, and intrusted with the editing of the *Recueil des Monuments Inédits de l'Histoire du Tiers État*, for the collection of documents relative to the history of France. In 1840 he published *Récits des Temps Mérovingiens*. His brother AMÉDÉE, born 1797, died 1873, was also a distinguished historian, his works chiefly dealing with Roman history.

Thiers (ti-är), a town in France, in the department of Puy-de-Dôme, on a hill washed by the Durole. It has considerable manufactures of cutlery and ironmongery, paper, candles, leather, &c. Pop. 12,784.

Thiers (ti-är), LOUIS ADOLPHE, president of the French republic, statesman and historian, was born at Marseilles 1797, died 1877. He studied law and at the age of twenty-two was admitted advocate. He soon relinquished law, however, for literature and politics (1821). Going to Paris, he after a lengthened struggle with poverty began to write for the *Constitutionnel* and other journals, and during the years 1823 to 1830 made a great reputation as a political writer. He was at the same time engaged on his *Histoire de la Revolution Française*. Taking part with Armand Carrel and Mignet in the foundation of the *National* (1830), he subsequently assisted in editing it, strongly advocating constitutional liberty in its columns. During the July revolution of 1830 the office of the *National* was the headquarters of the revolutionary party, and

in the government of Louis Philippe Thiers held several offices, till 1840 he found himself at the head of the ministry for a few months, and then retired into private life. After the revolution of 1848 he was elected deputy to the Assembly, and voted for the presidency of Louis Napoleon, but was ever after one of his fiercest opponents; and at the *Coup d'Etat* (Dec. 2, 1851) he was arrested and banished. Returning to France



Louis Adolphe Thiers.

in the following year, he remained in comparative retirement till 1863, when he was elected one of the deputies for Paris. During the terrible crisis of 1870-71 he came to the front as the one supreme man in France. After the fall of Paris he was returned to the National Assembly, and on Feb. 17, 1871, he was declared chief of the executive power. The first duty imposed upon him as such was to assist in drawing up the treaty of peace, whereby France lost Alsace and Lorraine and agreed to pay an enormous indemnity; his second was to suppress the Communist insurrection, which broke out within three weeks of the signing of the treaty. This done, his next task was to free the soil as quickly as possible from the invaders by the payment of the ransom, which also was effected in an incredibly short space of time. The Assembly in August 1871 prolonged his tenure of office and changed his title to that of president. In Nov. 1872 Thiers declared himself in favour of the republic as a definitive form of government for France, and thus to some extent brought about the crisis which resulted in his being deprived of the presidency. He accepted his deposition with dignity, and went quietly into retirement. M. Thiers' chief works are:

Histoire de la Revolution Française (6 vols., 1823-27), and Histoire du Consulat et de l'Empire (20 vols., 1845-62). The latter obtained for him the academic prize of twenty thousand francs.

Thionville (ti-on-vêl; German, *Diedenhofen*), a town of Germany, in Alsace-Lorraine, on the Moselle. It is walled and otherwise fortified, and during the Franco-German war it underwent a severe siege, falling into the hands of the Germans Nov. 25, 1870. Pop. 10,060.

Thirlmere, a small lake in the county of Cumberland, England, 5 miles S.E. of Keswick, the main reservoir of the water supply of Manchester.

Thirlwall, CONNOR, an English bishop and historian, born at Stepney, Middlesex, in 1797. Educated at the Charter-house and at Trinity College, Cambridge, he subsequently studied law, and was called to the bar in 1825; but having exchanged the law for the church he was ordained in 1828, and soon after received the living of Kirby Underdale, in Yorkshire. His first important work was a translation of Schleiermacher's Gospel of St. Luke, which appeared anonymously in 1825. His next work was that to which he owes his reputation—his *History of Greece*, the first edition of which appeared in Lardner's Cabinet Cyclopaedia, between 1835 and 1840. It was well received, and before the appearance of Grote's history was without a rival in the English language. In 1840 Thirlwall was presented by Lord Melbourne to the see of St. David's, which he held till within little more than a year of his death, which took place at Bath in 1875. In conjunction with Archdeacon Hare, Thirlwall published a translation of the second version of the first two volumes of Niebuhr's Roman History. He was a member of the committee for the revision of the Old Testament.

Thirsk, a market-town of England, N. Riding of Yorkshire, 21 miles N.W. of York. It consists of old and new towns, separated by a small stream, and a suburb (Sowerby); has a handsome church; and manufactures of agricultural implements, &c. Pop. (par.), 3093. There is a parl. div. named Thirsk and Malton.

Thirst, the sensations experienced in animals from the want of fluid nutriment. The sensations of thirst are chiefly referred to the thorax and fauces, but the condition is really one affecting the entire body. The excessive pains of thirst compared with those

of hunger are due to the fact that the deprivation of liquids is a condition with which all the tissues sympathize. Every solid and every fluid of the body contains water, and hence abstraction or diminution of the watery constituents is followed by a general depression of the whole system. Thirst is a common symptom of febrile and other diseases.

Thirty Tyrants. See *Greece (History)* and *Rome (History)*.

Thirty Years' War (1618 to 1648), a war in Germany, at first a struggle between R. Catholics and Protestants, but subsequently it lost its religious character and became a struggle for political ascendancy in Europe. On the one side were Austria, nearly all the R. Catholic princes of Germany, and Spain; on the other side were, at different times, the Protestant powers, and France. The occasion of this war was found in the fact that Germany had been distracted ever since the Reformation by the mutual jealousy of Catholics, Lutherans, and Calvinists. Certain concessions had been made to the Protestants of Bohemia by Rudolph II. (1609), but these were withdrawn by his successor Matthias in 1614, and four years afterwards the Bohemian Protestants were in rebellion. Count Thurn at the head of the insurgents repeatedly routed the imperial troops, compelling them to retire from Bohemia, and (in 1619) invaded the Archduchy of Austria. Matthias having died in 1619, he was succeeded by Ferdinand II. who was a rigid Catholic, but the Protestants elected as their king Frederick, Elector Palatine, who was a Protestant. Efforts at mediation having failed, the Catholic forces of Germany marched against Frederick, who, with an army of Bohemians, Moravians, and Hungarians, kept the field until Nov. 8 (1620), when he was totally routed at Weissenberg, near Prague, by Duke Maximilian of Bavaria. The Protestant cause was now crushed in Bohemia, and the people of that province suffered cruel persecution. The dominions of Frederick, the Palatinate of the Rhine included, were now conquered, the latter being occupied by Count Tilly, assisted by the Spaniards under Spinola. At the Diet of Ratisbon (March 1623) Frederick was deprived of his territories, Duke Maximilian receiving the Palatinate. Ferdinand, whose succession to the throne of Bohemia was thus secured, had now a favourable opportunity of concluding a peace, but his continued intolerance towards

the Protestants caused them to seek foreign assistance, and a new period of the war began. Christian IV. of Denmark, induced partly by religious zeal and partly by the hope of an acquisition of territory, came to the aid of his German co-religionists (1624), and being joined by Mansfeld and Christian of Brunswick, advanced into Lower Saxony. There they were met by Wallenstein, Duke of Friedland, who, in 1626, defeated Mansfeld at Dessau, while Tilly was also successful in driving Christian back to Denmark. In the peace of Lübeck which followed (May 1629) Christian of Denmark received back all his occupied territory, and undertook not to meddle again in German affairs. After this second success, Ferdinand again roused his people by an edict which required restitution to the R. Catholic church of all church-lands and property acquired by them since 1552. To the assistance of the Protestants of Germany, in these circumstances, came Gustavus Adolphus, King of Sweden, who landed (1630) with a small army upon the coast of Pomerania. Joined by numerous volunteers, and aided by French money, he advanced, and routed Tilly at Breitenfeld (or the battle of Leipzig, Sept. 1631), victoriously traversed the Main and the Rhine valleys, defeated Tilly again near the confluence of the Lech and the Danube (April 1632), and entered Munich. Meanwhile the emperor sought the aid of Wallenstein, by whose ability and energy Gustavus was obliged to retire to Saxony, where he gained the great victory of Lützen (Nov. 1632), but was himself mortally wounded in the battle. The war was now carried on by the Swedes under the chancellor Oxenstierna, till the rout of the Swedish forces at Nördlingen (Sept. 1634) again gave to the emperor the preponderating power in Germany. The Elector of Saxony, who had been an ally of Gustavus, now made peace at Prague (May 1635), and within a few months the treaty was accepted by many of the German princes. The Swedes, however, thought it to their interest to continue the war, while France resolved to take a more active part in the conflict. Thus the last stage of the war was a contest of France and Sweden against Austria, in which the Swedish generals gained various successes over the imperial forces, while the French armies fought with varied fortune in West Germany and on the Rhine. Meanwhile the emperor had died (1637), and had been succeeded by his son Ferdinand III. The

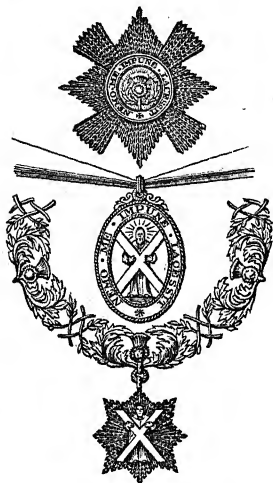
struggle still continued until, in 1646, the united armies of the French under the great generals Turenne and Condé, and the Swedes advanced through Suabia and Bavaria. The combined forces of Sweden, Bavaria, and France were then about to advance upon Austria, when the news reached the armies that the Peace of Westphalia (1648) was concluded, and that the long struggle was ended.

Thistle. See *Pyramus and Thisbe*.

Thistle, the common name of prickly plants of the tribe Cynaraceæ, nat. order Compositeæ. There are numerous species, most of which are inhabitants of Europe, as the musk-thistle (*Carduus nutans*), milk-thistle (*C. Mariānus*), welshed thistle (*C. acanthoides*), slender-flowered thistle (*C. tenuiflorus*), the spear thistle (*Cnicus lanceolatus*), and field thistle (*Cnicus arvensis*), a well-known plant very troublesome to the farmer. The blessed-thistle, *Carduus benedictus* of the pharmacopœias, *Cnicus benedictus* or *Cirsium benedictum* of modern botanists, is a native of the Levant, and is a laxative and tonic medicine. The cotton-thistle belongs to the genus *Onopordum*. The common cotton-thistle (*O. Acanthium*) attains a height of from 4 to 6 feet. It is often regarded as the Scotch thistle, but it is doubtful whether the thistle which constitutes the Scottish national badge has any existing type, though the stemless thistle (*Cnicus acaulis* or *Cirsium acule*) is in many districts of Scotland looked on as the true Scotch thistle. The carline thistle (which see) belongs to the genus *Carlina*. Some species are cultivated in gardens from the beauty of their flowers. Thistles sow themselves readily by their winged seeds.

Thistle, ORDER OF THE, a Scottish order of knighthood, sometimes called the order of St. Andrew. It was instituted by James VII. (James II. of England) in 1687, when eight knights were nominated. It fell into abeyance during the reign of William and Mary, but was revived by Queen Anne in 1703. The insignia of the order consist of a gold collar composed of thistles interlaced with sprigs of rue; the jewel, a figure of St. Andrew in the middle of a star of eight pointed rays, suspended from the collar; the star, of silver and eight-rayed, four of the rays being pointed, while the alternate rays are shaped like the tail-feathers of a bird, with a thistle in the centre surrounded by the Latin motto *Nemo me impune lacessit*; and the badge, oval, with the motto surrounding the figure

of St. Andrew. The order consists of the sovereign and sixteen knights, besides extra knights (princes), and a dean, a secretary,



Order of the Thistle—Star, Jewel, Badge, and Collar.

the lyon-king-at-arms, and the gentleman usher of the green rod.

Tholen, an island in the province of Zealand, Holland, between the Scheldt and the Maas, with an area of 34,000 acres, and a pop. of 14,078.

Tholuck (tō'lyk), FRIEDRICH AUGUST GOTTFREU, a German theologian, born 1799, died 1877. He was educated at the universities of Breslau and Berlin, and after studying the oriental languages for some time devoted himself to theology. His first work, *Die Wahre Weihe des Zweiflers* (The True Consecration of the Doubter), was published in 1822. Tholuck filled the chair of theology at Halle from 1826 till his death. He was the author of *A Reply to Strauss*, several commentaries, and works on oriental subjects.

Thomas, St., also called DIDYMUS, one of the twelve apostles, said to have been a native of Antioch. The particulars of his life are unknown, the chief fact known regarding him being his doubts as to the living reality of Christ after the resurrection. He figures largely in the apocryphal gospels, and tradition has it that he acted as a Christian missionary in Ethiopia, Egypt, India, and even America.

Thomas, St., island of Africa. See *St. Thomas*.

Thomas, CHRISTIANS OF ST. See *Christians of St. Thomas*.

Thomas, GEORGE HENRY, American general, was born in Virginia in 1816, and at the age of twenty entered the military academy at West Point, passing into the artillery as sub-lieutenant at the age of twenty-four. He took part in the Mexican war (1846-47); was appointed professor at West Point in 1850; recalled to active service in 1855, and employed in Texas against the Indians. When the war of secession broke out Thomas had attained the rank of colonel, and being appointed brigadier-general of volunteers in August 1861, was some months later sent into Kentucky, where, in the following year, he defeated Zollikofer. As major-general of volunteers he took part in the battle of Murfreesborough, where he greatly distinguished himself; while at the bloody battle of Chickamauga, in Sept. 1863, he saved the Federal army from destruction by his stubborn resistance after the defeat of the Federal right. In the campaign of 1865 he defeated Hood, and compelled the Confederates to raise the siege of Nashville, for which he received the thanks of Congress, and was raised to the rank of major-general in the regular army. He died in 1870.

Thomas à Kempis, that is, *Thomas of Kempen*, his birthplace, in the archbishopric of Cologne, was born about 1380. At the age of twenty he retired to an Augustine convent near Zwolle, in Holland, where he took the vows, and where, in 1471, he died superior of the convent. He was a voluminous writer. His works (the printed ones all in Latin) consist of sermons, exhortations, ascetic treatises, hymns, prayers, &c. His name, however, would hardly be remembered were it not for its connection with the celebrated devotional work called *The Imitation of Christ* (*De Imitatione Christi*), a work which has passed through thousands of editions in the original Latin and in translations. The authorship of this book has long been a disputed point. It is generally ascribed to à Kempis, but often to Gerson, chancellor of the University of Paris at the end of the 14th and beginning of the 15th century.

Thomas Aquinas. See *Aquinas*.

Thomas the Rhymers. See *Rhymers*.

Thomists, the followers of Thomas Aquinas. See *Scholasticism*.

Thompson, BENJAMIN. See *Rumford* (Count).

Thoms, WILLIAM JOHN, born 1803, died 1885. He was secretary to the Camden Society from 1838 to 1873; deputy-librarian to the House of Lords; originator and for many years editor of *Notes and Queries*, and author of various antiquarian works.

Thomson, SIR CHARLES WYVILLE, naturalist, born in 1830 in Linlithgowshire; died 1882. Educated at the University of Edinburgh, he became professor of mineralogy and geology in Queen's College, Belfast, in 1854. In the dredging expeditions of the *Lightning* and *Porcupine* (1868-69) he took part, afterwards publishing in *The Depths of the Sea* (1869) the substance of his discoveries in regard to the fauna of the Atlantic. In 1869 he became fellow of the Royal Society; in 1870 professor of natural history in the University of Edinburgh. In 1872 he was appointed scientific chief of the *Challenger* expedition, which was absent from England 3½ years, during which time 68,890 miles were surveyed. On his return he was knighted, and intrusted by the government with the task of drawing up a report on the natural history specimens collected during the expedition. But he only lived to publish a preliminary account of the expedition, *The Voyage of the Challenger: the Atlantic* (1876-78). See *Challenger Expedition*.

Thomson, JAMES, poet, was born in 1700, at Ednam, near Kelso, in Scotland, his father being minister of Ednam parish, and was educated at Jedburgh and the University of Edinburgh. He went in 1725 to London, where *Winter*, the first of his poems on the seasons, was published in 1726. In 1727 he published his *Summer*, his *Poem to the Memory of Sir Isaac Newton*, and his *Britannia*, in 1728 his *Spring*, and in 1730 his *Autumn*. After travelling for some time on the Continent with the son of Sir Charles Talbot, the chancellor, he was rewarded with the post of secretary of briefs, which he held till the death of the chancellor (1737), when he received a pension of £100 from the Prince of Wales. Meanwhile he had brought on the stage his tragedy of *Sophonisba* (1729) and published his poem on *Liberty*, the cool reception of which greatly disappointed him. He now (1738) produced his tragedy of *Agamemnon*, and a third entitled *Edward and Eleanor*. In 1740 he composed the masque of *Alfred* in conjunction with Mallet; but which of them wrote the famous song, *Rule, Britannia*, is not known. In

1745 his most successful tragedy, *Tancred and Sigismunda*, was brought out and warmly applauded. The following year he produced his *Castle of Indolence*, a work in the Spenserian stanza. For a few years he held by deputy the comfortable post of surveyor-general of the Leeward Islands, and he died in 1748. He left a tragedy entitled *Coriolanus*, which was acted for the benefit of his relatives. Thomson was greatly beloved for his amiability and kindness of heart. His *Seasons*, on which his fame rests, abounds in sensibility and beauty of natural description. His *Castle of Indolence*, though not so popular as the *Seasons*, is highly esteemed, but his tragedies are almost forgotten.

Thomson, JAMES, poet, was born at Port-Glasgow, Scotland, in 1834, and was brought up at the Caledonian Orphan Asylum, both his parents having died when he was very young. He became a schoolmaster in the army, but quitted that occupation in 1862, and became clerk in a solicitor's office. In 1860 he became a contributor to the *National Reformer*, in which was published, under the signature 'B. V.,' *The Dead Year, To our Ladies of Death*, and the poem by which he is best known, *The City of Dreadful Night* (1874). Among his other works are: *Tasso and Leonora* (1856), *The Doom of a City* (1857), *Sunday at Hampstead* (1863), *Sunday up the River* (1868), *A Voice from the Nile* (1881), and *Insomnia* (1882). Thomson's verse is characterized by much brilliancy and traits of graceful humour, but its prevailing tone is one of despair. He died in 1882.

Thomson, REV. JOHN, a landscape-painter, born at Dailly, Ayrshire, in 1776, succeeded his father as minister of that parish in 1800, and exchanged that living for *Duddingston*, near Edinburgh, in 1805, dying there in 1840. Thomson early turned his attention to art, and produced a large number of landscapes, which are considered to rank him among the best painters of his native land.

Thomson, JOSEPH, F.R.G.S., African explorer, born at Penpont, Dumfriesshire, 1858, and educated at Edinburgh. When twenty years of age he accompanied Keith Johnston to Central Africa, assuming full charge of the expedition on the death of Mr. Johnston. In 1882 he explored the Rovuma in East Africa, and in 1884 made an important journey through Masai Land, in eastern

equatorial Africa. Among his other achievements were expeditions to the Atlas Mountains, the rivers Niger and Benue, Zambesia, &c. He died in 1895. He published *Through Masai Land, To the Central African Lakes and back, Travels in the Atlas and Southern Morocco, Life of Mungo Park, &c.*

Thomson, THOMAS, Scottish chemist, born at Crieff in 1773, died 1852. He adopted the medical profession, and embraced chemistry more especially as his favourite pursuit. In 1802 he published the first edition of his *System of Chemistry*, which obtained rapid success both in Great Britain and on the Continent. It was followed in 1810 by his *Elements of Chemistry*, and in 1812 by his *History of the Royal Society*. In 1813 he went to London and commenced there a scientific journal, the *Annals of Philosophy*, which he continued to edit till the end of 1820. The lectureship (afterwards the regius professorship) in chemistry in Glasgow University was conferred on him in 1817. His great work on the atomic theory was published in 1825, under the title of *Attempt to establish the First Principles of Chemistry by Experiment*. In 1830-31 he published his *History of Chemistry* in two volumes, and in 1836 appeared his *Outlines of Mineralogy and Geology*.

Thomson, THOMAS, antiquary, brother of the Rev. John Thomson, of Duddingston, born at Dailly, Ayrshire, 1768; died 1852. He was called to the Scottish bar in 1793, appointed deputy-clerk register 1806, and principal clerk of session 1828. He was an early contributor to the *Edinburgh Review*, and president of the Bannatyne Club, for which and for the Maitland Club he edited numerous valuable works.

Thomson, WILLIAM, Archbishop of York, was born at Whitehaven, Feb. 11, 1819, and educated at Shrewsbury School and Queen's College, Oxford, of which he was successively fellow, tutor, and head. In 1858 he was chosen preacher of Lincoln's Inn, and in 1859 was appointed one of her majesty's chaplains in ordinary. Two years later (1861) he was raised to the episcopal bench as bishop of Gloucester and Bristol; but before he had held the appointment twelve months he was transferred to the archbishopric of York. Dr. Thomson is the author of a number of works, including: *An Outline of the Necessary Laws of Thought*; *The Atoning Work of Christ, viewed in Relation to some Current Theories*; *Crime and its Excuses*; *Life in the Light of*

God's Word (sermons); *Limits of Philosophical Inquiry*; *Design in Nature*; and a series of essays entitled *Word, Work, and Will*. He died in 1890.

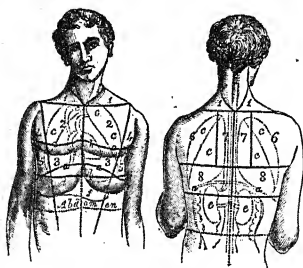
Thomson, SIR WILLIAM, LORD KELVIN, one of the greatest mathematicians and physicists of modern times, was born at Belfast in 1824, his father being James Thomson, LL.D., from 1832 professor of mathematics in Glasgow University. He distinguished himself at Glasgow University, and then at Peterhouse, Cambridge, where he graduated (1845) as second wrangler, and first Smith's prizeman, and was elected to a fellowship, becoming also editor of the Cambridge and Dublin Mathematical Journal, to which he contributed many valuable papers. In 1846 he was appointed professor of natural philosophy in the University of Glasgow, a post which he held till 1899. Among the most important of his contributions to electrical science are the construction of several delicate instruments for the measurement and study of electricity, and for its practical application. It was in connection with submarine telegraphy that his name became most generally known, his services being rewarded, on the completion of the Atlantic cable of 1866, with knighthood and other honours. In 1892 he was created a baron. He has greatly increased our knowledge of magnetism and heat, and invented an improved form of mariner's compass now in extensive use. He was president of the British Association at Edinburgh in 1871, and of the Royal Society in 1890-95. He died in 1907. He produced, jointly with Professor Tait, a well-known treatise on natural philosophy, and an extensive collection of his mathematical and other papers has appeared, as well as *Popular Lectures and Addresses, &c.*

Thor, son of Odin by Jörd (the earth), the Jupiter of the Teutons, the God of thunder. *Thursday* has its name from him. See *Northern Mythology*.

Thoracic Duct. See *Lymph*.

Thorax, the chest, or that cavity of the human body formed by the spine, ribs, and breast-bone, situated between the neck and the abdomen, and which contains the pleura, lungs, heart, &c. The name is also applied to the corresponding portions of other mammals, to the less sharply defined cavity in the lower vertebrates, as birds, fishes, &c., and to the segments intervening between the head and abdomen in insects and other

Arthropoda. In serpents and fishes the thorax is not completed below by a breast-bone. In insects three sections form the thorax, the *pro-thorax*, bearing the first pair



Thorax in Man.

Thoracic regions denoted by thick black lines. 11, Right and left Humerus; 22, do. Subclavian; 33, do. Mammary; 44, do. Axillary; 55, do. Subaxillary or Lateral; 66, do. Scapular; 77, do. Interscapular; 88, do. Superior Dorsal or Subscapular. —Viscera or contents of Thorax, the position of which is indicated by dotted lines. *aa*, Diaphragm; *b*, Heart; *c*, Lungs; *d*, Liver; *e*, Kidneys; *f*, Stomach.

of legs; the *meso-thorax*, bearing the second pair of legs and first pair of wings; and the *meta-thorax*, bearing the third pair of legs and the second pair of wings.

Thoreau (tho'ro), HENRY DAVID, American writer, born at Boston in 1817, and educated at Harvard University, where he graduated in 1837. From that time till 1840 he was engaged as a schoolmaster. Then for several years he occupied himself in various ways, in land-surveying, carpentering, and other handicrafts, but devoting a great part of his time to study and the contemplation of nature. In 1845 he built for himself a hut in a wood near Walden Pond, Concord, Mass., and there for two years lived the life of a hermit. After quitting his solitude, Thoreau pursued his father's calling of pencil-maker at Concord, where he died in 1862. Besides contributing to the *Dial* and other periodicals, he published *A Week on the Concord and Merrimac Rivers* (1849), and *Walden, or Life in the Woods* (1854). After his death appeared *Excursions in Field and Forest*, *The Maine Woods*, *Cape Cod*, and *A Yankee in Canada*. Thoreau was a friend of Emerson, and imbibed much of his spirit and method of thought.

Thorium, a rather rare metal; symbol Th, atomic weight 232.5. It is mainly obtained from monazite sand, and also occurs in the mineral *thorite*. Its oxide, ThO_2 , is known as *thoria*, and together with ceria,

the oxide of cerium, forms one of the essential constituents of the ordinary incandescent gas mantles. The cotton mantle is first saturated with a solution of thorium nitrate, then dried and ignited, and finally coated with a layer of shellac varnish.

Thorn. See *Hawthorn*.

Thorn, a town and strong fortress of Prussia, province of West Prussia, on the Vistula. It consists of an old and a new town, has several churches, one of them containing a statue of Copernicus, who was born here; manufactures of machinery, soap, and a famous gingerbread. Pop. 46,000.

Thornaby-on-Tees. See *Stockton*.

Thorn-apple. See *Datura*.

Thorn-back Ray. See *Ray*.

Thornbury, WALTER, a miscellaneous writer, born in London in 1828. Beginning his literary career in Bristol at the age of seventeen, he soon after settled in London, where for thirty years he was almost continuously at work writing for Household Words, *Once a Week*, and *Athenæum*, &c. Among his numerous works are *Shakspeare's England*, *Songs of the Cavaliers and Roundheads*, *Haunted London*, *Legendary and Historic Ballads*, and a *Life of Turner*, under the supervision of Ruskin. He died in 1876.

Thornhill, SIR JAMES, an English painter, born in 1676, died in 1734. He was much engaged in the decoration of palaces and public buildings, in which his chief works are to be found. Among his best efforts may be mentioned the dome of St. Paul's, the saloon and refectory at Greenwich Hospital, and some rooms at Hampton Court. His forte was in the treatment of allegorical subjects.

Thorough-bass. See *Bass*.

Thoroughwort. See *Boneset*.

Thorpe, BENJAMIN, an English scholar who greatly furthered the study of Anglo-Saxon, born 1782, died 1870. Among his numerous publications are an English edition of Kask's Anglo-Saxon Grammar, *Ancient Laws and Institutes of the Anglo-Saxon Kings*, *The Gospels in Anglo-Saxon*, an edition of *Beowulf*, *The Anglo-Saxon Chronicle*, *Northern Mythology*, &c.

Thorwaldsen (tor'våld-sén), ALBERT BARTHOLOMEW (Bertel), a celebrated sculptor, born at Copenhagen Nov. 19, 1770. At first he helped his father to cut figure-heads in the royal dockyard, then, after some years' study at the Academy of Arts, he won the privilege of studying three years abroad.

Going to Rome (1797) he was much impressed by the works of Canova the sculptor, and Carstens the painter, who were then residing there. It was not until 1803, however, that he became at all widely known. Then by a lucky chance he received a commission from Sir Thomas Hope to execute in marble a statue of Jason, which the sculptor had modelled. His fortune was now made. Commissions flowed in upon him, new creations from his hand followed in quick succession, and his unsurpassed abilities as a sculptor became everywhere recognized. In 1819 he returned to Denmark, and his journey through Germany and his reception at Copenhagen resembled a triumph. After remaining a year in Copenhagen and executing various works there, he returned to Rome, visiting on his way Berlin, Dresden, Warsaw, and Vienna. He remained at Rome till 1838, when he undertook another journey to Copenhagen, being principally moved to this step by the contemplated establishment in that city of a museum of his works and art treasures. His return was a sort of national festival. The remainder of his life was spent chiefly in the Danish capital, where he died March 24, 1844. The Thorwaldsen Museum, opened in 1846, contains about 300 of the works of the sculptor. Thorwaldsen was eminently successful in his subjects chosen from Greek mythology, such as his Mars, Mercury, Venus, &c. His religious works, among which are a colossal group of Christ and the Twelve Apostles, St. John Preaching in the Wilderness, and statues of the four great prophets, display almost superior grandeur of conception. Chief among his other works are his statues of Galileo and Copernicus, and the colossal lion near Lucerne, in memory of the Swiss guards who fell in defence of the Tuilleries.

Thoth, an Egyptian deity identified by the Greeks with Hermes (Mercury), to whom was attributed the invention of letters, arts, and sciences. The name is equivalent in significance to the Greek Logos, and Thoth is a mythical personification of the divine intelligence.

Thou (tò), JACQUES AUGUSTE DE, a French statesman and historian, born in 1553, died in 1617. Henry IV. employed him in several important negotiations, and in 1593 made him his principal librarian. In 1595 he succeeded his uncle as chief-justice, and during the regency of Mary de Medici he was one of the directors-general of finance.

His greatest literary labour was the composition in Latin of a voluminous History of his own Times (*Historia sui Temporis*), comprising the events from 1545 to 1607, of which the first part was made public in 1604. To this work, which is remarkable for its impartiality, he subjoined interesting Memoirs of his own Life.

Thourout (tò-rò), a town of Belgium, in the province of West Flanders, with various manufactures and a large trade. P. 10,146.

Thousand and One Nights. See *Ara-bian Nights*.

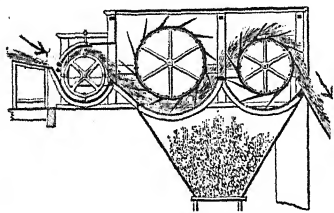
Thousand Islands, a group of small islands numbering about 1800 in the St. Lawrence immediately below Lake Ontario. They partly belong to Canada and partly to the state of New York, and have become a popular summer resort.

Thrace, or THRACIA, a name applied at an early period among the Greeks to a region lying north of Macedonia. By the Romans this country was regarded as divided into two parts by the Hæmus (or Balkan), the northern of which was called Moesia and the southern Thrace. The Greeks early settled colonies on the coasts, and the country, besides possessing rich meadows and corn-lands, abounded in mines, while the Thracian horses and riders rivalled those of Thessaly. Of the rivers of Thrace the largest and most celebrated was the Hebrus (now Maritza). Abdera, the birthplace of Democritus and Protagoras; Sestos, on the Hellespont, celebrated in the story of Hero and Leander; and Byzantium, on the peninsula on which Constantinople now stands, were the places the most worthy of note.

Thrashing-machine, a machine for separating grain from the straw, and in which the moving power is that of horses, oxen, wind, water, or steam. The thrashing-machine was invented in Scotland in 1758 by Michael Stirling, a farmer in Perthshire; it was afterwards improved by Andrew Meikle, a millwright in East Lothian, about the year 1776. Since that time it has undergone various improvements. The principal feature of the thrashing-machine as at present constructed, is the three rotary drums or cylinders, which receive motion from a water-wheel, or from horse or steam power. The first drum which comes into operation has projecting ribs called beaters on its outer surface, parallel to its axis. This drum receives a very rapid motion on its axis. The sheaves of corn are first spread out on a slanting table, and are then drawn

THRASIMENE—THRESHER-SHARK.

in with the ears foremost between two feeding rollers with parallel grooves. The beaters of the drum act on the straw as it passes through the rollers, and beat out the grain. The thrashed straw is then carried forward to two successive drums or *shakers*, which, being armed with numerous spikes,



Section of Scotch Threshing-machine.

lift up and shake the straw so as to free it entirely from the loose grain lodged in it. The grain is made to pass through a grated floor, and is generally conducted to a winnowing-machine connected by gearing with the threshing-machine itself, by which means the grain is separated from the chaff. Improved machines on the same principle, many of them portable, are extensively used in England and America, those of the latter country being in particular very light and effective. The portable steam threshing-machine now common in England and in many parts of Scotland has no feeding-rollers, the corn being fed direct to the first drum, which revolves at a very high speed and separates the grain by rubbing against a grating fitted around the drum rather than by direct beating. It gets through far more work than the ordinary stationary mill. With a portable engine the machine can be moved from field to field, and also from farm to farm, thus being capable of performing the threshing-work of a wide district for the whole season.

Thrasimene (or **TRASIMENUS**), LAKE. See *Perugia, Lago di*.

Thread, a slender cord consisting of two or more yarns, or simple spun strands, firmly united together by twisting. The twisting together of the different strands or yarns to form a thread is effected by a thread-frame or doubling and twisting machine, which accomplishes the purpose by the action of bobbins and flyers. Thread is used in some species of weaving, but its principal use is for sewing. The manufacture of sewing thread in the United Kingdom both for home use

and export is very extensive. As a general rule the thread manufactured for home use, and for export to the United States, is much superior to that made for other markets, which is of an inferior quality. The thread made for home use is commonly known as six-cord, and that for export as three-cord thread. The chief seat of the cotton thread manufacture in Scotland is Paisley, in England Manchester. Linen thread is manufactured largely in Ireland.

Thread-worms, the name for thread-like intestinal worms of the order Nematoda. The *Oxyuris vermicularis* occurs in great numbers in the rectum of children particularly. See *Nematelmia*.

Threatening. By the common law of England to threaten bodily hurt is a civil injury against the person, and pecuniary damages can be recovered for interruption of a man's business through fear of such threats. Any person accusing or threatening to accuse any other person of infamous or other crimes, with the view to extort gain, is guilty of felony. Similar provisions are made against sending or delivering any letter threatening any house, ship, &c., or to wound or maim cattle; sending or delivering any threatening letter demanding any property or valuable. Any person who maliciously sends or delivers, knowing the contents, any letter threatening to kill or murder any person is liable to penal servitude for any term between ten and five years, or to imprisonment or whipping. The intimidation of workmen to induce them to yield to combinations or associations is provided for by an act of 1875, the penalty being a fine not exceeding £20, or imprisonment for a term not exceeding three months.

Three Rivers, a town of Canada, in the province of Quebec, at the confluence of the rivers St. Maurice and St. Lawrence, with an extensive trade in timber, and important industries of various kinds. Three Rivers is the residence of a Roman Catholic bishop, and has a Roman Catholic cathedral. Fire caused great loss in 1908. Pop. 9981.

Thresher-shark, also called the **Fox-shark**, a genus of sharks containing but one known species (*Alopias vulpes*), with a short conical snout, and less formidable jaws than the white shark. The upper lobe of the tail fin is very elongated, being nearly equal in length to the rest of the body, and is used as a weapon to strike with. Tail included, the thresher attains a length of

THRIFT—THULE.

13 feet. It inhabits the Atlantic and the Mediterranean, and is sometimes met with on the coasts of Britain. See *Shark*.

Thrift. See *Sea-pink*.

Thrips, a genus of minute insects, order Hemiptera, sub-order Homoptera, closely allied to the Aphides. They are extremely agile, and seem to leap rather than fly. They live on flowers, plants, and under the bark of trees. *T. cerealium* is a common British species, scarcely a line in length or in extent of wing, residing in the spathes and husks of cereals, especially wheat, to which it is most injurious.

Throat, the anterior part of the neck of an animal, in which are the œsophagus and windpipe, or the passages for the food and breath. See *Larynx*, *Œsophagus*, *Trachea*, *Diphtheria*, *Croup*, &c.

Thrombosis, the formation of a clot in the heart or a blood-vessel which may block the vessel, causing serious results.

Throstle. See *Thrush*.

Thrush, the name applied popularly to several insectorial birds. The true thrushes (*Turdidae* or *Merulide*) form a family of dentiostiral passerine birds, including the song-thrush or throstle, the missel-thrush, the blackbird, &c. They feed upon berries, small molluscs, worms, &c. Their habits are mostly solitary, but several species are gregarious in winter. They are celebrated on account of their powers of song; and are widely diffused, being found in all the quarters of the globe. The missel-thrush (*Turdus viscivorus*), the largest of the British resident species, attains a length of 11 inches, and is coloured a reddish-brown on the upper parts and yellowish-white below, the under surface being prettily marked with jetty black spots, of triangular form on the throat and neck and round on the chest and belly. It begins to breed early in April, and its song, which is sweet and powerful, may be heard as early as February. The song-thrush (*Turdus musicus*) is especially distinguished by its sweet song, begun in early spring and continuing even to November or December. The colour is a brown of different shades on the upper parts, the chin being white, and the belly and under tail-coverts a grayish-white. Its average length is 9 inches. The eggs, numbering five, are blue, spotted with black. The nest is large and basin-shaped, composed of roots, mosses, &c., smoothly plastered inside with clay. The thrush family also includes the fieldfare, redwing, and ring-ouzel.

Thrush, a disease common in infants who are ill fed. (See *Aphthæ*.) The name is also applied to an abscess in the feet of horses and some other animals.

Thua'nus. See *Thou, De*.

Thucydides (thō-sid'i-dēz), the greatest of all the Greek historians, was born in Attica about 471 B.C. He was well born and rich, being the possessor of gold mines in Thrace, and was for a time a prominent commander during the Peloponnesian war, which forms the subject of his great work. For many years he suffered exile (being accused of remissness in duty); but appears to have returned to Athens the year following the termination of the war, namely, in B.C. 403. He is said to have met a violent death, probably a year or two later, but at what exact time, and whether in Thrace or Athens, is not known. His history consists of eight books, the last of which differs from the others in containing none of the political speeches which form so striking a feature of the rest, and is also generally supposed to be inferior to them in style. Hence it has been thought by various critics to be the work of a different author, of Xenophon, of Theopompus, or of a daughter of Thucydides; but it is more probable that it is the author's own without his final revision. The history is incomplete, the eighth book stopping abruptly in the middle of the twenty-first year of the war. As a historian Thucydides was painstaking and indefatigable in collecting and sifting facts, brief and terse in narrating them. His style is full of dignity and replete with condensed meaning. He is unsurpassed in the power of analysing character and action, of tracing events to their causes, of appreciating the motives of individual agents, and of combining in their just relations all the threads of the tangled web of history. The best translations are by Jowett and Dale.

Thugs, the name applied to a secret and once widely-spread society among the Hindus, whose occupation was to waylay, assassinate, and rob all who did not belong to their own caste. This they professed to do, partly at least, from religious motive, such actions being deemed acceptable to their goddess Kālī. In 1830-35 the government took active measures against them, and Thuggery soon became practically extinct. They were chiefly confined to Central India.

Thuja. See *Arbor Vitæ*.

Thule (thō'le), the name given by the ancients to the most northern country with

which they were acquainted. According to Pytheas it was an island six days' voyage to the north of Britannia, and accordingly it has often been identified with Iceland. Some have imagined it to be one of the Scotch islands, others the coast of Norway.

Thumb-screw, a former instrument of torture for compressing the thumbs. It

was employed in various countries, Scotland in particular. Called also *Thumbkins*.

Thun (tün), a town of Switzerland, in the canton of Bern, beautifully situated at the north-western extremity of the lake of its own name, at the point where the Aar issues from it. It is the seat of the Swiss military school, and the chief place of arms in the country. Pop. 6069.—The lake is 10 miles long, 2 broad, and about 720 feet deep. At its south-eastern extremity it receives the surplus waters of the Lake of Brienz by the Aar, which again emerges from its north-western extremity.

Thunder. See *Lightning*.

Thunder-fish, a species of fish of the family Siluridae, found in the Nile, which, like the torpedo, can give an electric shock. It is the *Malapterurus electricus* of naturalists.

Thundering Legion. See *Aurelius Antoninus*.

Thurgau (túr'gou), a canton in the north-east of Switzerland, bounded mainly by the Lake of Constance and the cantons of Zürich and St. Gall; area, 381 square miles; capital, Frauenfeld. It differs much in physical conformation from most other Swiss cantons, in having no high mountains, though the surface is sufficiently diversified. The whole canton belongs to the basin of the Rhine, to which its waters are conveyed chiefly by the Thur and its affluents, and partly also by the Lake of Constance, including the Untersee. The principal crops are grain and potatoes; large quantities of fruit are also grown. In many places the vine is successfully cultivated. The manufactures consist chiefly of cottons, hosiery, ribbons, lace, &c. Pop. 113,110.

Thurible, a kind of censer of metal, sometimes of gold or silver, but more commonly of brass or latten, in the shape of a covered

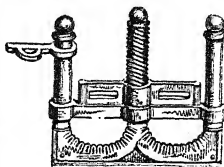
vase or cup, perforated so as to allow the fumes of burning incense to escape. It has chains attached, by which it is held and swung at high mass, vespers, and other solemn offices of the Roman Catholic Church.

Thüringerwald (tū'ring-ér-vált), or **FOREST OF THURINGIA**, a mountain chain in the centre of Germany, stretching south-east to north-west for about 60 miles. Its culminating points are the Beerberg and the Schneekopf, which have each a height of about 3220 feet. The mountains are well covered with wood, chiefly pine. The minerals include iron, copper, lead, cobalt, &c.

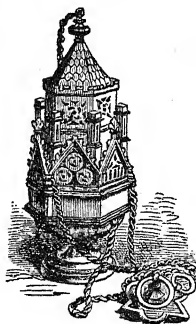
Thuringia (thō-rin'ji-a; German, *Thüringen*, tū'ring-én), a region of Central Germany situated between the Harz Mountains, the Saale, the Thüringerwald, and the Werra, and comprising great part of Saxe-Weimar, Saxe-Coburg-Gotha, and other small adjoining states.

Thurles, town in Ireland, in the county of Tipperary, on both banks of the Suir, with considerable trade, and a R. Catholic cathedral, R. Catholic college, court-house, &c. Pop. 4511.

Thurlow, EDWARD, LORD, lord-chancellor of England, was born at Little Ashfield, near Stowmarket, Suffolk, in 1732, and educated at Cambridge. Entering the Middle Temple, he was called to the bar in 1754. In 1761 he attained the rank of king's counsel, and soon had one of the best practices at the bar. In 1768 he was returned to parliament for Tamworth, was made solicitor-general in 1770, attorney-general in 1771, and lord-chancellor in 1778, being raised to the peerage as Baron Thurlow. He was compelled to resign office on the dissolution of the ministry in 1783, but he was still considered the confidential adviser of the king, and on the dissolution of the coalition ministry at the close of the year the great seal was restored to him by Pitt. He continued to hold office when in 1788 the king's illness rendered it necessary to consider the contingency of a regency. Pitt



Scotch Thumb-screw, time of Charles I.



Thurible.

suspected Thurlow of intriguing with the Prince of Wales, and from this time an open disagreement took place between them. Pitt demanded his dismissal, to which the king at once agreed, and he was deprived of the great seal June 1792. After this he possessed little political influence. He died in 1806.

Thursday (that is, 'Thor's day'), the fifth day of the week, so called from the old Teutonic god of thunder, Thor. See *Thor*.

Thursday Island, a small island of Queensland, in Normanby Sound, Torres Straits. It is a government station, and the harbour—Port Kennedy—is one of the finest in this quarter. It is in the direct tract of all vessels reaching Australia by Torres Straits; is the centre of a large and important pearl and béche-de-mer fishery; and is a dépôt of trade with New Guinea. Pop. 1400.

Thurso, a seaport of Scotland, in the county of Caithness, on the shore of the bay of the same name. The chief trade is the exportation of grain, cattle, agricultural produce, and excellent paving-stones. Pop. 3723.

Thyestes (thi-es'téz), in Greek mythology, son of Pelops and Hippodamia, and grandson of Tantalus. Having seduced the wife of his brother Atreus, the latter, in revenge, served up to him the body of his own son at a feast. See *Atreus*.

Thylacine (*Thylacinus cynocephalus*), a carnivorous marsupial animal inhabiting Tasmania, and commonly known as the Tasmanian wolf. In size it is generally about 4 feet in total length, though some specimens attain a much greater size. It is nocturnal in its habits; of a fierce and most determined disposition, and is very destructive to sheep and other animals. It has an elongated and somewhat dog-like muzzle, and a long tapering tail; the fur is grayish-brown with a series of bold transverse stripes, nearly black in colour, beginning behind the shoulders and ending at the tail.

Thylacoleo, a remarkable extinct carnivorous marsupial, whose bulk and proportions appear to have equalled the lion. Its fossil remains are found in Australia.

Thyme (tim; *Thymus vulgaris*), a small plant of the natural order Labiate, a native of the south of Europe, and frequently cultivated in gardens. It has a strong aromatic odour, and yields an essential oil, which is used for flavouring purposes. The fragrant wild thyme of the British uplands and hills is the *Thymus Serpyllum* of botanists. Both species afford good bee-pasture.

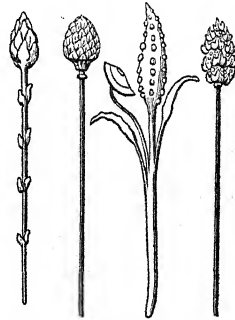
Thymalea'cea, the *Daphne* family, an order of exogenous plants, consisting of shrubs or small trees, rarely herbs, with non-articulated, sometimes spiny branches, with tenacious bark. The leaves are alternate and opposite, and the flowers spiked and terminal. The fruit is nut-like or drupaceous. The species are not common in Europe, they are found chiefly in the cooler parts of India and South America, at the Cape of Good Hope, and in Australia. See *Daphne* and *Lacc-bark Tree*.

Thymus Gland, a ductless temporary organ situated in the middle line of the body. After the end of the second year of life it decreases in size, and almost or wholly disappears at puberty. It is covered in front by the breast-bone, and lies on the front and sides of the windpipe. Its functions are still undetermined.

Thyroid Cartilage. See *Larynx*.

Thyroid Gland, a ductless structure in man which covers the anterior and inferior part of the larynx and the first rings of the windpipe. It is of a reddish colour, and is more developed in women than in men. It may become abnormally enlarged, as in *goitre*, or diseased, as in *myxœdema* (which see). Its use is doubtful, but it doubtless exerts some useful influence on the system.

Thysrus, among the Greeks, a wand or spear wreathed with ivy leaves, and with a



Various forms of Thysrus, from ancient Vases.

pine-cone at the top, carried by the followers of Bacchus as a symbol of devotion. In ancient representations it appears in various forms.

Thysanura ('fringe-tailed'), an order of apterous insects that undergo no metamorphosis, and have, in addition to their feet, particular organs of motion, generally

at the extremity of the abdomen. The group is often divided into two families, Poduridae or spring-tails, and Lepismidae or sugar-lice, &c. Recently it has been divided into two orders by Sir John Lubbock: 1. Collembola, comprising those members known as spring-tails, and nearly co-equal with the Poduridae; 2. Thysanura (restricted), comprising those whose anal bristles do not form a spring, as the Lepismidae. See *Poduridae*, *Lepismidae*.

Tia'ra, originally the cap of the Persian kings. The tiara of the pope is a high cap, encircled by three coronets with an orb and cross of gold at the top, and on two sides of it a chain of precious stones. The mitre alone was first adopted by Damasus II. in 1048. It afterwards had a plain circlet of gold put round it. It was surmounted by a coronet by Boniface VIII. The second coronet was added by Benedict XII., the third coronet by Urban V.

Tibbus, a people of the Eastern Sahara, probably allied in race to the Berbers.

Tiber (Italian, *Tevere*; anciently, *Tibēris*), a celebrated river of Italy, which rises in the Apennines, in Tuscany, and, after a general southerly course of about 240 miles, falls into the Mediterranean by two mouths (one of them artificial). It traverses the city of Rome, here forming the island anciently called *Insula Tiberina*. About ninety miles of its course are navigable for small vessels; those of about 140 tons burden reach Rome. It is subject to floods, and carries down quantities of yellowish mud, hence its designation 'the yellow Tiber.' See *Rome*.

Tiberias. See *Galilee*, *Sea of*.

Tiberius, in full, **TIBERIUS CLAUDIUS NERO CÆSAR**, a Roman emperor, born B.C. 42, was the son of Tiberius Claudius, of the ancient Claudian family, and of Livia Drusilla, afterwards the wife of the emperor Augustus. Tiberius became consul in his twenty-eighth year, and was subsequently adopted by Augustus as his heir. In A.D. 14 he succeeded to the throne without opposition. Dangerous mutinies broke out shortly afterwards in the armies posted in Pannonia and on the Rhine, but they were suppressed by the exertions of the two princes, Germanicus and Drusus. The conduct of Tiberius as a ruler was distinguished by an extraordinary mixture of tyranny with occasional wisdom and good sense. Tacitus records the events of the reign, including the suspicious death of Germanicus,

the detestable administration of Sejanus, the poisoning by that minister of Drusus, the emperor's son, and the infamous and dissolute retirement of Tiberius (A.D. 27) to the Isle of Capree, in the Bay of Naples, never to return to Rome. The death of Livia in A.D. 29 removed the only restraint upon his actions, and the destruction of the widow and family of Germanicus followed. Sejanus, aspiring to the throne, fell a victim to his ambition in the year 31; and many innocent persons were destroyed owing to the suspicion and cruelty of Tiberius, which now exceeded all limits. He died in March 37.

Tibesti, a region of the Eastern Sahara, supporting a scanty population of the Tibbu race.

Tibet', or **TIBET'**, a country occupying the south portion of the great plateau of Central Asia, lying between lon. 73° and 101° E., and lat. 27° and 36° N., and extending east and west from Cashmere and the Karakorum range to the frontiers of China; area about 700,000 sq. miles. Its plains average above 10,000 feet in height, and many of its mountains have twice that altitude. In Tibet nearly all the great rivers of South and East Asia take their rise (Indus, Brahmaputra, Hoang-ho, Yang-tse-kiang, &c.), and there are numerous salt and fresh-water lakes, situated from 13,800 to 15,000 feet above the sea-level. The climate is characterized by the excessive dryness of the atmosphere, and the severity of the winter. From October to March vegetation is almost wholly dried up, and the cold is intense. Notwithstanding the inclemency of the weather there is a great abundance of wild and domestic animals. Of these the most remarkable is the yak, which exists both wild and domesticated. It supplies food and clothing, and is also used as a beast of burden. Other animals include the musk-deer, the Cashmere goat, wild sheep, wild horses, and fat-tailed sheep. Agriculture is practised to a comparatively small extent, suitable localities being rare. Minerals include gold, copper, iron, borax, and rock-salt. Tibet does a good trade with China, giving gold-dust, incense, wool, &c., for tea, silks, and other produce. There is a small trade with India; Yatung, Gartok, and Gyangtze being now marts. The capital is Lhasa. The religion is Buddhism in a form known as Lamaism (which see), of which Tibet is the principal seat. The *lamas* or priests form a large proportion of the population, and live in monasteries;

the two grand-lamas being the religious and political heads of the state, the latter called Dalai Lama. The inhabitants are of an amiable disposition, but much averse to intercourse with foreigners, few of whom have reached the capital. Their mode of life is rude. Polyandry is common. The language is allied to Chinese, and has been long written. Tibet was governed by its own princes till early in the 18th century; since 1720 it has been a dependency of China. There are two head Chinese functionaries, called *ambans*, charged respectively with foreign and military affairs; and there are Chinese troops in the principal towns. Owing to the refusal of the Tibetans to carry out treaty agreements, a military mission from India forced its way to Lhasa in 1904, and obtained a convention providing for the opening of trade marts and better relations—political and other—in future. Pop. about 6,000,000.

Tib'ia, a kind of pipe, the commonest musical instrument of the Greeks and Romans. It had holes at proper intervals, and was furnished with a mouthpiece. For the tibia in anatomy see *Leg*.

Tibul'us, **ALBIUS**, a Roman elegiac poet, who belonged to the equestrian order, and died in the flower of his age, about B.C. 18. His poems are among the most perfect of their kind, but their moral tone is that of a reckless voluptuary. We possess four books of elegies under his name, but the third and part of the fourth are spurious.

Tic Douloureux (dô'lô-rê), a painful affection of a facial nerve, a species of neuralgia. It is characterized by acute pain, attended with convulsive twitchings of the muscles, and continuing from a few minutes to several hours. It occurs on one side of the face, and may be caused by a diseased tooth, by inflammation in the ear passage, by exposure to cold, by dyspepsia, &c. The removal of the cause is the natural remedy; and warm applications, the employment of electric currents over the nerve, and morphia administered subcutaneously, are sometimes efficient.

Ticino (ti-chê'nô; German and French, *Tessin*), a river of Switzerland and North Italy, which rises in Mount St. Gothard, and after a course of about 120 miles joins the Po on the left. It traverses Lake Maggiore and separates Piedmont from Lombardy.

Ticino (German and French, *Tessin*), a canton in the south of Switzerland; area,

1088 square miles. The northern and greater part of this canton is an elevated and mountainous region, the Splügen, St. Bernardin, and Mount St. Gothard forming its northern boundary. The chief river is the Ticino, and there are numerous small lakes. Lake Maggiore is partly within the canton. In the north the principal occupations are cattle-rearing and the preparation of dairy produce. In the south the olive, vine, figs, citrons, and pomegranates are grown. Manufactures and trade are unimportant. The chief towns are Bellinzona, Locarno, and Lugano. Pop. 138,638, most of whom are R. Catholics and speak Italian.

Tickell, **THOMAS**, an English man of letters, born in 1686. His success in literature and in life was mainly due to Addison, who procured for him in 1717 an under-secretaryship of state. In 1725 he was appointed secretary to the lords-justices of Ireland, a post he held till his death in 1740. His chief works are *Prospect of Peace*, a ballad entitled *Colin and Lucy*, and a fine elegy on the death of Addison.

Ticket-of-leave, a certificate given to a convict by which he is permitted to go at liberty, under certain restrictions, before the expiration of his sentence. A period of remission according to the conduct of the prisoner is now systematic in Britain.

Tickling, a strong cloth, commonly made of twilled linen or cotton and of a striped pattern. It is chiefly used for covering mattresses for beds.

Ticknor, **GEORGE**, American historian, born at Boston in 1791, died there in 1871. He graduated at Dartmouth College in 1807, and was admitted to the bar in 1813. In 1815 he embarked for Europe, and visited the chief capitals for the purpose of pursuing his studies. On his return in 1820 he was appointed professor of modern languages and literature in Harvard University. In 1835 he resigned his professorship, and for the next three years travelled in Europe with his family. In 1849 he published a *History of Spanish Literature* (three vols. 8vo, New York), corrected and enlarged editions being subsequently published. It was at once recognized by scholars as a work of value, and has been translated into Spanish and German. After some works of minor interest he produced in 1863 a *Memoir of Prescott*, the historian, with whom he had maintained a close friendship.

Ticks, a family of the Acarida or mites, class Arachnida. They are parasitic ani-

TICONDEROGA — TIDES.

mals, possessing oval or rounded bodies, and mouths, in the form of suckers, by which they attach themselves to dogs, sheep, oxen, and other mammals. Birds and reptiles are also annoyed by the attacks of certain species.

Ticonderoga, a village and township in Essex county, New York, United States. It is situated upon the stream connecting Lakes George and Champlain, and figured prominently during the colonial and revolutionary period, having a fortress built by the French in 1755. Pop. 2300.

Tide-mill is a kind of water-mill turned by the action of the tide.

Tides, the rising and falling of the water of the sea, which occurs periodically, as observed at places on the coasts. The tide appears as a general wave of water, which gradually elevates itself to a certain height, then as gradually sinks till its surface is about as much below the medium level as it was before above it. From that time the wave again begins to rise; and this reciprocating motion of the waters continues constantly, with certain variations in the height and in the times of attaining the greatest degree of height and of depression. The alternate rising and falling of the tide-wave are observed to take place generally twice in the course of a lunar day, or of 24 hours 49 minutes of mean solar time, on most of the shores of the ocean, and in the greater part of the bays, firths, and rivers which communicate freely with it. The tides form what are called a *flood* and an *ebb*, a *high* and *low water*. The whole interval between high and low water is often called a *tide*; the water is said to *flow* and to *ebb*; and the rising is called the *flood-tide* and the falling the *ebb-tide*. The rise or fall of the waters, in regard to elevation or depression, is exceedingly different at different places, and is also variable everywhere. The interval between two succeeding high-waters is also variable. It is shortest about new and full moon, being then about 12 hours 19 minutes; and about the time of the moon's quadratures it is 12 hours 30 minutes. But these intervals are somewhat different at different places. Tides are caused by the attraction which the sun and moon exert over the water of the earth. The moon is the nearest

of the heavenly bodies to the earth, and the mobile nature of water leads it to yield readily to the attractive influence. Those parts of the waters directly under the moon's vertical path in the heavens are drawn out towards the moon. At the same time the moon attracts the bulk of the earth, and, as it were, pulls the earth away from the water on the surface furthest from it, so that here also the water is raised, although not quite so much as on the nearer side. The waters being thus heaped up at the same time on these two opposite parts of the earth, and the waters situated half-way between them being thus necessarily depressed, two *high* and two *low tides* occur in the period of a little more than one revolution of the earth on its axis. The sun's influence upon the

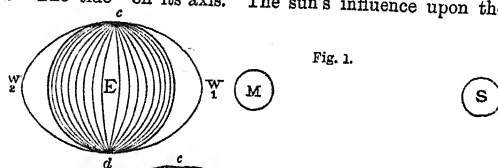


Fig. 1.

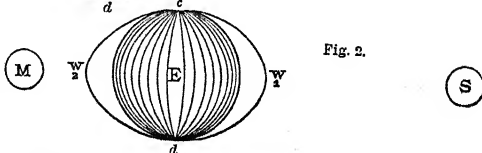


Fig. 2.

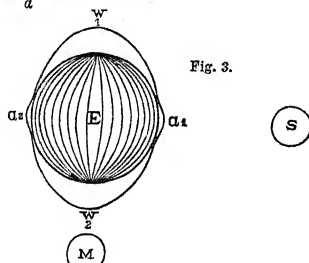


Fig. 3.

Tides.

tides is evidenced in its either increasing or diminishing the lunar tide, according as the sun's place in the heavens coincides with the line of the moon's attraction, or the reverse. It is this difference which produces what are known as *spring* tides and *neap* tides. Spring tides occur at new and full moon, and are the result of the gravitating influence of both sun and moon; neap tides occur when the moon is in her quarters, and are not so high as the spring tides, the lunar

influence being lessened by the sun's force acting in a direction at right angles to it. The accompanying figures illustrate the theory of the tides, Σ being the earth, α the moon, s the sun, w_1 w_2 the water raised up by attraction on the opposite sides of the earth. Fig. 1 shows spring tide at new moon, fig. 2 spring tide at full moon, the low tides being at c and d . Fig. 3 illustrates the neap tides, a_1 a_2 being small tides caused by the sun alone. The interference of coasts and irregularities in the ocean beds cause the great variations as to time and range in the actual tides observed at different places. In some places, as in the German Ocean at a point north of the Straits of Dover, a high tide meets low water, and thus maintains perpetual mean tide. In the case cited high water transmitted through the Straits of Dover encounters low water transmitted round the north of Scotland, and *vice versa*. The interval of time at any place between noon and the time of high water on the day of full or new moon is called the *establishment of the port*.

Tidore, one of the Moluccas (which see).

Tieck (tēk), **LUDWIG**, German writer, born at Berlin in 1773. He was educated at the University of Halle, and at Göttingen and Erlangen, and having returned to Berlin came forward as a writer of tales and romances, including his tale of *Abdallah*, and a novel entitled *William Lovell* (three vols., Berlin, 1795-96). His *Peter Lebrecht*, a History without Adventures, and *Peter Lebrecht's Volksmärchen* displayed great imaginative power and rich humour. At Jena in 1799-1800 he entered on friendly relations with the Schlegels, Novalis, Brentano, and others, and through this association arose what has been denominated as 'the Romantic School of Germany.' In 1799 he published *Romantische Dichtungen* (two vols., 1799-1800), and in 1804 appeared his comedy *Kaiser Octavianus*. His *Phantasus* (three vols., Berlin, 1812-15), however, gave the first sign of his having freed himself from the mysticism and extravagance of his earlier works. In 1817 he visited England, where he collected material for his *Shakspeare*; and on his return resided at Ziebingen till 1819, when he removed to Dresden. From this period his writings, as exemplified in his *Tales*, bear the true stamp of genius. These tales were ultimately published complete in twelve volumes (Berlin, 1853), the principal being

Dichterleben (A Poet's Life—Shakspeare); *Der Tod des Poeten* (The Poet's Death—Camœns); the *Witches' Sabbath*; and *Anfuhr in den Cevennen* (Revolt in the Cevennes), an incomplete work. In 1826 he published his *Dramaturgische Blätter* (two vols., Breslau). His study of Shakspeare resulted in *Shakspeare's Vorschule* (two vols., Leipzig, 1823-29); and the continuation of the German translation of Shakspeare commenced by Schlegel. His last story of importance was *Vittoria Accorombona* (1840). On the accession of Friedrich William IV. Tieck was invited to the Prussian court in 1841, invested with a considerable pension and the rank of a privy-councillor, and thenceforward acted as a sort of supervisor for the Prussian stage. He died at Berlin on the 28th April, 1853.—His brother, **CHRISTIAN FRIEDRICH**, born in 1776, died in 1851, was celebrated as a sculptor.

Tiel, a town in Holland, in the province of Gelderland, 19 miles w.s.w. of Arnhem, on the right bank of the Waal. It carries on a good general trade. Pop. 10,300.

Tientsin, a town in the north of China, the river-port of Peking, with which it communicates by the Pei-ho river. This river is only navigable by native craft, and large vessels anchor outside its mouth, in the Taku roadstead. In winter the river is frozen. There is now railway communication with Peking and Taku, also with Manchuria, &c. There is a large trade in European goods, Tientsin being one of the treaty ports. The imports include cottons, sugar, hardware, opium, &c.; exports, wool, cotton, camel's hair, &c. The Taku forts were taken by the British and French in 1860, and so was Peking. The city suffered in the troubles of 1900, and was occupied by the European forces. Pop. 950,000.

Tier'ra (or **TERRA**) **del Fue'go** ('Land of Fire'), a large group of islands at the southern extremity of South America, separated from the mainland by the Strait of Magellan. It consists of one large island and numerous smaller, with a total area of about 32,000 square miles. The eastern part of the group belongs to the Argentine Republic, the western to Chili. These islands consist largely of mountains covered with ice and snow, or with stunted forests, mainly of evergreen-beech. Yet there are considerable areas suited for pasturage if not for tillage, and large sheep-farms are now common. The climate is moist and chilly. The natives partly resemble the

Patagonians; but others are short and stunted, and degraded in habits. Tierra del Fuego was discovered by Magalhaens in 1520, and named 'Land of Fire' from the fires he saw on its coast at night.

Tiers-état (ti-är-zä-tü; 'third estate'), the name given in the ancient French monarchy to the third order of the nation, which, together with the nobility and clergy, formed the *états généraux* (states-general). It consisted of the deputies of the *bourgeoisie*, that is, the free inhabitants of the towns and communes who did not belong to either of the other two estates. In 1789 the states-general, or rather the *tiers-état* by itself, assumed the name of the National Assembly.

Tiflis, capital of a government of the same name and of Russian Caucasia, is situated on the river Kur, 500 feet above the level of the Black Sea. The town has a large square, one or two handsome streets, and some fine buildings, including hotels and public offices. Manufactures include cotton and silk, leather, soap, &c. The artisans of Tiflis are celebrated as silversmiths, gunsmiths, and sword makers. The town is connected by rail with Poti, Batoum, and Baku, and the foreign trade of Trans-Caucasia with Asia is mostly carried on from Tiflis. Pop. 160,645.—The government has an area of 15,000 sq. miles; is very mountainous; produces cereals, fruits, &c., in the valleys, and has immense forests of excellent timber. Pop. 1,040,943.

Tiger (*Felis tigris* or *Tigris regalis*), a well-known carnivorous animal, possessing, in common with the lion, leopard, &c., five toes on the front feet and four on the hinder feet, all the toes being furnished with strong retractile claws. The tiger is about the height of the lion, but the body is longer and the head rounder. It is of a bright fawn-colour above, a pure white below, irregularly crossed with black stripes. The tiger attains its full development in India, the name of 'Bengal tiger' being generally used as synonymous with those specimens which appear as the typical and most powerful representatives of the species. The tiger also occurs in Java and Sumatra. In habits it is far more active and agile than the lion, and exhibits a large amount of fierce cunning. It generally selects the neighbourhood of water-courses as its habitat, and springs upon the animals that approach to drink. 'Man-eaters' are tigers which have acquired a special liking for

human prey. The natives destroy tigers by traps, pits, poisoned arrows, and other means. Tiger-hunting is a favourite Indian sport.

Tiger-beetle (*Cicindela campestris*), a species of coleopterous insects which are swift and active in their movements, and prey upon other insects.

Tiger-cat, a name of not very definite signification, sometimes given to some of those animals of the family Felidæ which are of middling size, and resemble the tiger in their form or markings, such as the chati, the margay, the ocelot, the serval, &c., which see.

Tiger-flower (*Tigridia pavonia*), a Mexican bulbous plant of the natural order Iridaceæ, frequently cultivated in gardens on account of the magnificence of its flowers. The stem is about 1 foot in height, with sword-shaped leaves. The flowers are large, of a singular form, and very evanescent. The petals are of a fine orange-red towards the extremity; whitish or yellowish and beautifully spotted at the base.

Tiger-lily (*Lilium tigrinum*), a native of China, common in English gardens, having scarlet flowers turned downward, the perianth being reflexed. It is remarkable for having axillary buds on the stem. The bulbs are eaten in China and Japan.

Tiger-moth (*Aretia caje*), a genus of lepidopterous insects, the caterpillars of which are well known under the popular name of 'woolly bears.' The moth is coloured red and brown. The larvae feed on dead-nettles.

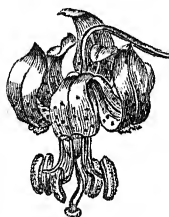
Tighe (ti), MARY BLACKFORD or, an Irish poetess, born in Dublin in 1774, and married to Henry Tighe, of Woodstock, M.P., in 1793. Her writings were only published after her death, which took place March 24, 1810. Her chief poem is *Psyche*, or the *Legend of Love*, written in the Spenserian stanza. Her other poems are short occasional pieces, frequently of a religious cast.

Tiglath-Pile'ser. See *Assyria*.

Tigra'nes. See *Armenia*.

Tigré. See *Abyssinia*.

Tigris, a river in Western Asia, having its principal source in the Turkish province of Diarbekir, on the southern slope of the



Tiger-lily (*Lilium tigrinum*).

Anti-Taurus, a few miles to the east of the Euphrates. It flows generally south-east, passes Diarbekir, Mosul, and Bagdad, and joins the Euphrates somewhat more than 100 miles from its embouchure in the Persian Gulf, after a course of 1100 miles, the united stream being known as the Shatt-el-Arab. Large rafts, supported by inflated skins, are much in use for the transport of goods. Between the Tigris and the Euphrates lies the celebrated region Mesopotamia.

Tikus. See *Bulau*.

Til, TIL-SEED, TEEL-SEED, the seed of the *Sesamum indicum* (see *Sesamum*), also of *Guizotia oleifera*, a small plant belonging to the Compositæ, extensively cultivated in parts of India for the bland oil obtained from the seed.

Tilburg, a town, Holland, province of North Brabant, with numerous woollen factories, calico-printing works, &c. Pop. 42,000.

Tilbury, a place in England, in the county of Essex, on the north side of the estuary of the Thames, opposite to Gravesend, with a celebrated fort, forming the main defence of the Thames above Sheerness. Near this place the English army was reviewed by Queen Elizabeth in 1588, when the country was threatened by the Spanish Armada. Quite recently extensive docks and quays with a tidal basin, &c., have been constructed here.

Tiles, a term applied to a variety of articles made either for ornament, such as inlaid paving tiles (see *Encaustic Tiles* and *Mosaic*), or for use, as in tile-draining (see *Draining*) and roofing, which last are made similarly to bricks, and of similar clay.

Tiliacæ, the lime-tree family, a natural order of polypetalous dicotyledonous plants, consisting chiefly of trees or shrubs, with simple, toothed, alternate leaves, furnished with stipules. The species are generally diffused throughout the tropical and temperate parts of the globe. They have all a mucilaginous wholesome juice, and are remarkable for the toughness of the fibres of their inner bark, which is used for various economical purposes under the name of *bast*. Among the most important genera are *Tilia* and *Corechorus*, the former containing the common lime, the latter jute.

Till, a name in Scotland for unstratified stony boulder-clays, and now extended by geologists to any similar surface or drift deposit.

Tilland'sia, a genus of epiphytes, belong-

ing to the natural order Bromeliacæ, natives of tropical America. *T. americana* and *T. splendens* are cultivated in hot-houses on account of the singular variety and splendour of the colours of their spathe and flower-spikes. *T. usneoides* is a native of the Southern U. States, where it hangs in festoons from trees. **Tiller,** the lever or handle of the helm by which the rudder is turned. See *Steering Apparatus*.

Tillicoultry (til-i-kô'tri), a small manufacturing town and police burgh in Clackmannanshire, Scotland, 2 miles west of Dollar. The manufacture of shawls, plaids, tartans, and tweeds, &c., is largely carried on. Pop. 3338.

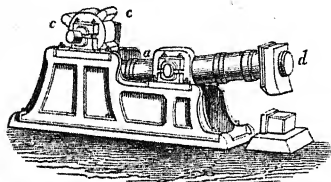
Tillotson, JOHN, an English prelate, son of a clothier near Halifax, was born in 1630. In 1647 he became a student of Clare Hall, Cambridge, and he was elected a fellow in 1651. He was a Presbyterian preacher until 1662, when he submitted to the Act of Uniformity, and was chosen preacher to the society of Lincoln's Inn, and lecturer at St. Lawrence, Jewry, in 1664. After becoming a D.D. in 1666, he was made king's chaplain, and presented to a prebend of Canterbury. He was subsequently appointed dean of Canterbury, and in 1689 he became dean of St. Paul's. During the suspension of Archbishop Sancroft, Tillotson exercised the archiepiscopal jurisdiction, and in 1691 reluctantly accepted the archbishopric. His liberal views rendered him obnoxious to the advocates of orthodoxy, and he was assailed with great animosity after his acceptance of the primacy. He died in 1694. Tillotson's sermons were at one time very popular.

Tilly, JOHANN TSERKLAES, COUNT OF, one of the most celebrated generals of the 17th century, born about 1559, in Walloon Brabant. After being educated by the Jesuits he served successively in the Spanish, Austrian, and Bavarian armies. On the outbreak of the Thirty Years' war he led the army destined to crush the Protestants in Bohemia. (See *Thirty Years' War*.) He defeated them on the White Mountains (Nov. 1620), and in 1622 conquered the Palatinate, defeating several Protestant commanders. On the 27th August, 1626, he defeated Christian IV. of Denmark in Brunswick, and compelled him to return to his own country. In 1630 Tilly succeeded Wallenstein as generalissimo of the imperial troops. His most celebrated exploit is the bloody sack of Magdeburg, May 10, 1631. Gustavus Adolphus met him at

Breitenfeld, near Leipzig, September 7, and Tilly was entirely beaten, and was himself wounded. In a subsequent engagement with the Swedes on the Lech a cannon-ball shattered his thigh, and caused his death in 1632.

Tilsit, a town of East Prussia, on the Memel, by means of which it carries on a large trade. Manufactures include iron castings, machinery, paper, cloth, soap, oils, leather, cheese, &c. Pop. 36,300. The town is celebrated for the peace concluded here in July 1807 between Russia and Prussia and Napoleon. See *Prussia*.

Tilt-hammer, a large and heavy hammer worked by steam or water power, and used in forgings. It has been largely superseded



Tilt-hammer.

by the steam-hammer, but is still advantageously used with light work. Cogs (as at *c c* in cut) being brought to bear on the tail of the hammer (*a*), its depression causes the head (*d*) to be elevated, which, when the tail is liberated, falls with considerable force by its own weight.

Timber, a general term applied to wood used for constructive purposes, as that of the different kinds of fir and pine, the oak, ash, elm, beech, sycamore, chestnut, walnut, mahogany, teak, &c. The sap in timber is the great cause of its decay; hence, at whatever period timber is felled, it requires to be thoroughly seasoned before being used in building. The object of seasoning is partly to evaporate the sap, and partly to reduce the dimensions of the wood so that it may be used without further shrinking. Timber seasons best when placed in dry situations, where the air has a free circulation round it. Wood for building becomes compact and durable after two or three years' seasoning. But this mode of seasoning only removes a portion of the aqueous and volatile matter from the wood, the extractive and soluble portion still remains, and is liable to ferment on the reabsorption of moisture. It is often extremely difficult to preserve wood which is to be exposed to the

weather, or is to remain in a warm and moist atmosphere. No entirely satisfactory process has yet been discovered for the preservation of timber and the prevention of dry-rot. The most successful method consists in extracting the sap, in excluding moisture, and in impregnating the vessels of the wood with antiseptic substances such as creosote. The sap may be extracted by *water seasoning*, in which the green timber is immersed in clear water for about two weeks, being then seasoned in the usual manner. It has also been proposed to extract the sap by means of an air-pump. The *charring* of timber on the outside is commonly supposed to increase its durability, but experiments on this subject do not agree. The exclusion of moisture by covering the surface with a coating of paint, varnish, tar, &c., is a well-known preservative of wood exposed to the weather. But painting is no preservative against the internal or dry rot. Only wood thoroughly seasoned should be painted. Resinous woods are more durable than others, and the impregnation of wood with tar, bitumen, and other resinous substances undoubtedly promotes its preservation. Wood impregnated with drying oils becomes harder and more capable of resisting moisture. Common salt (chloride of sodium) is a well-known preservative. The immersion of seasoned timber in sea-water is generally admitted to promote its durability. Sir W. Burnett found that the application of chloride of zinc to wood was a good preservative. Creosote is now extensively used for the preservation of wood. The value of wood or timber imported into Britain annually is over £27,000,000.

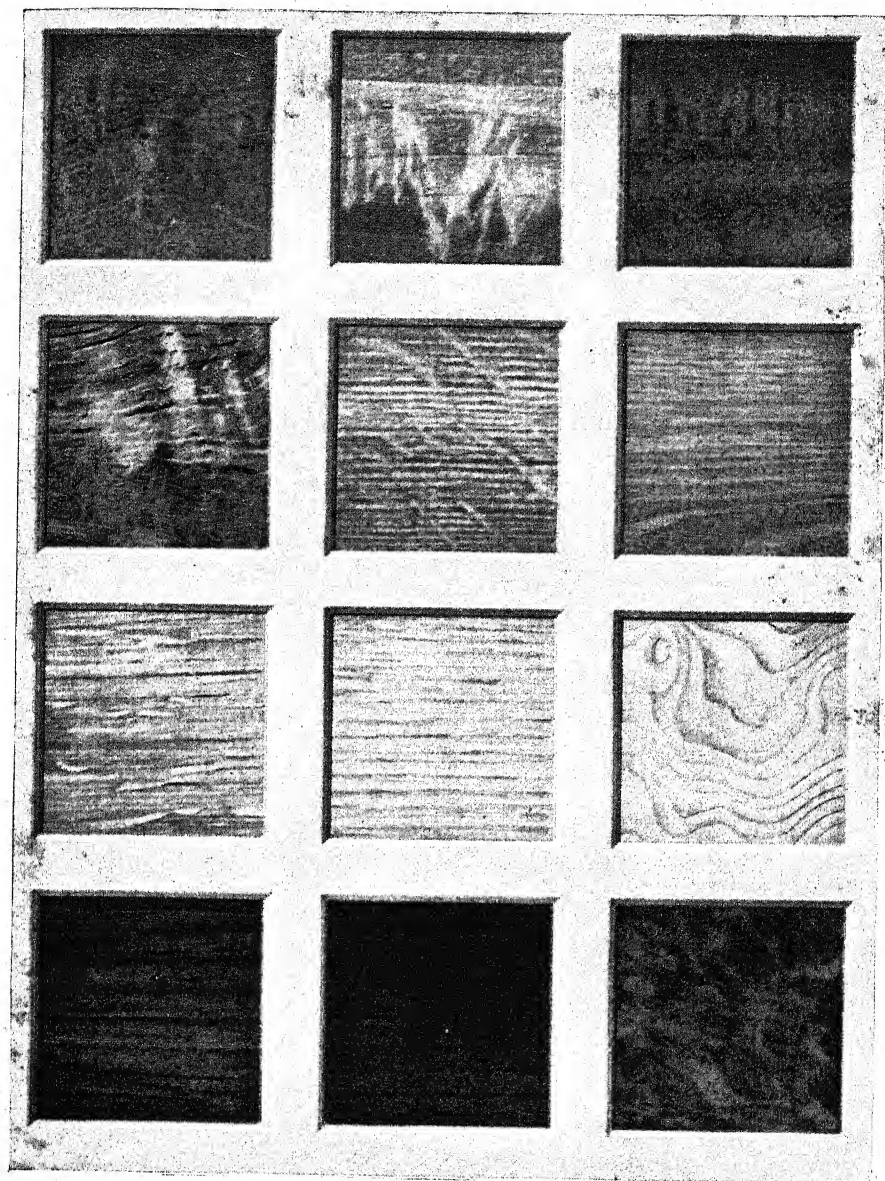
Timbrel, a kind of drum, tabor, or tabret, in use from the highest antiquity, and much the same as the tambourine.

Timbuctoo', a city of Africa, near the southern edge of the Sahara, an important centre of trade 6 miles north from the main stream of the Niger, in French territory. It mostly consists of clay houses, but there are also several mosques and a citadel. It depends chiefly on commerce, being a centre of caravan trade and of traffic along the Niger. It is now accessible from the coast by railway and river steamer. There is here an extensive traffic in European goods. Pop. estimated at 10,000–15,000.

Time, in music. See *Music*.

Time, the general idea of successive existence, or that in which events take place, space being that in which things are con-

TIMBER—I

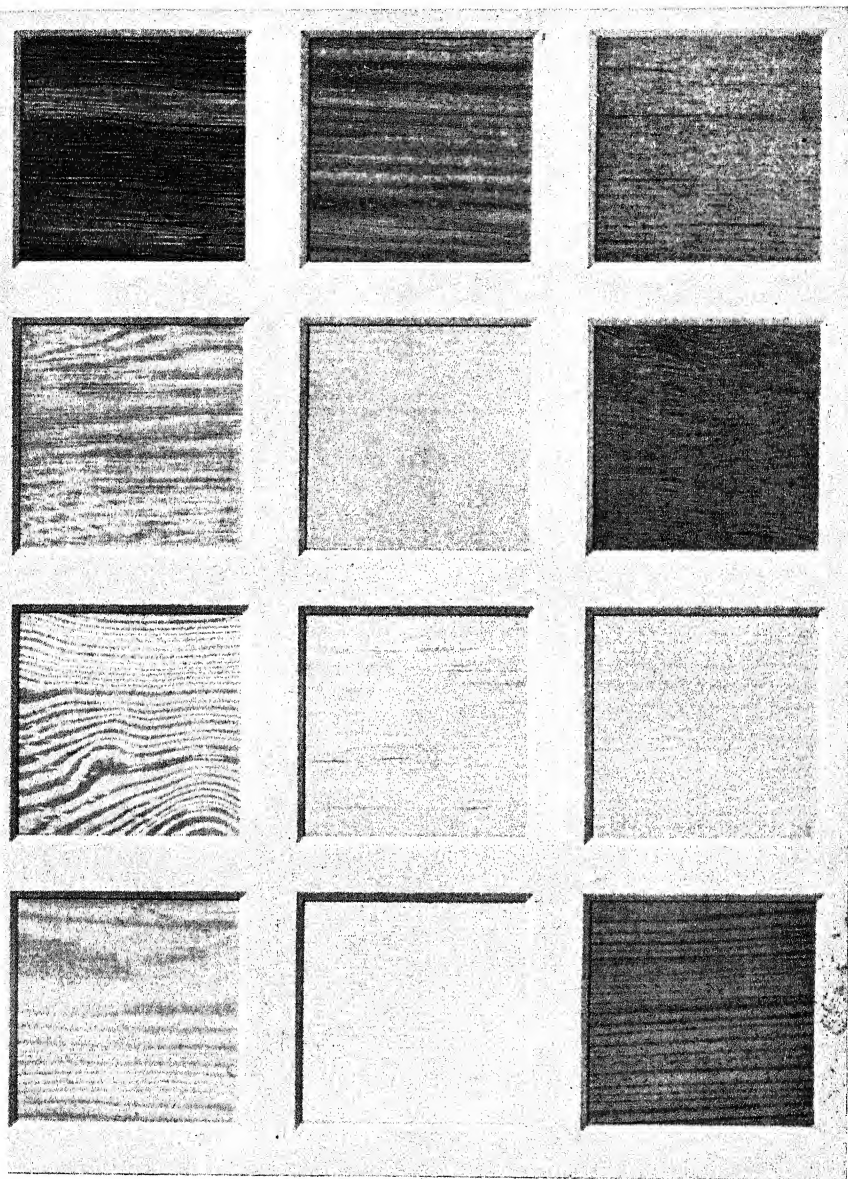


HARDWOODS

First Row—Spanish Mahogany. Honduras Mahogany. African Mahogany.
Second Row—English Brown Oak. Austrian Wainscot Oak. Stettin Oak.
Third Row—Indian Quartered Oak. American Red Oak. Ash.
Fourth Row—Italian Walnut. American Black Walnut. Amboyna.



TIMBER—II



HARD WOODS AND SOFTWOODS

First Row—Rosewood Padouk or Burmese Rosewood. Teak.

Second Row—Canadian Elm. Canary Wood. Jarrah.

Third Row—Pitch Pine. Canadian White Pine. Kauri Pine.

Fourth Row—Red Deal or Fir. White Deal. Sequoia or Californian Redwood.

tained. (See *Space*.) *Relative time* is the sensible measure of any portion of duration, often marked by some phenomenon, as the apparent revolution of the celestial bodies, more especially of the sun, or the rotation of the earth on its axis. Time is divided into years, months, weeks, days, hours, minutes, and seconds; but of these portions the years and days only are marked by celestial phenomena. (See *Day, Year*.) The instruments employed for measuring time are clocks, watches, chronometers, hour-glasses, and dials; but the three first are those chiefly used.

Times, THE. This journal first appeared under the title of the *Daily Universal Register* on Jan. 13, 1785. It was founded by John Walter, a London printer, and is still in the proprietorship of his descendants. On Jan. 1, 1788, the name was changed to *The Times*, or *Daily Universal Register*, the latter title being ultimately dropped. Under the management of the second John Walter, son of the first, *The Times* soon acquired the leading place among London journals owing to the accuracy and freshness of its news, and its independent tone. Special correspondents were engaged at home and abroad, and *The Times* often got earlier information of important foreign events than the government itself. In 1814 steam-printing machinery was introduced to meet the increasing necessity of rapid production. (See *Printing*.) Two years before Mr. Walter had appointed Dr. Stoddart literary editor of the paper, who held the post for five years. His successor was Mr. Thomas Barnes, whose chief collaborators were Lord Brougham and Edward Sterling (the father of John Sterling). Some brilliant articles written by the latter gained for the *Times* the appellation of *The Thunderer*. In 1841 Mr. Barnes died, and was succeeded by Mr. John T. Delane. In this year the paper rendered a signal service to the commercial world by detecting and exposing a conspiracy which, if successful, would have defrauded the leading banking-houses of Europe of about a million sterling. In 1847 the second John Walter died. In 1856 *The Times* began to be printed with stereotype plates, and the printing machinery has been several times improved, the last improvements resulting in the construction of the Walter Press. Mr. Delane retired from the editorship in 1877. Prof. Thos. Chenerly followed as editor, and in 1884 Mr. George E. Buckle. A series of articles entitled '*Parnellism and Crime*', in 1887, led to heavy

litigation and a parliamentary commission. (See *Parnell*.) There is also a weekly edition of the paper. Lately *The Times* has taken an active part in connection with the issue and sale of various books.

Timo'leon, in ancient Greek history, a native of Corinth, born about 400 B.C. He was passively involved in the assassination of his brother Timophanes, who wished to usurp the supreme power, and spent twenty years in voluntary exile. On the invitation of his fellow-citizens he returned and took command of the troops sent to Sicily to aid the Syracusans against Dionysius the Younger and the Carthaginians (344 B.C.). He expelled Dionysius from Syracuse (343 B.C.), and totally routed the Carthaginians (339 B.C.). Having restored their liberty to the Syracusans, and recalled the exiles and fugitives, he gave the citizens a new and more stable constitution, and finally, having accomplished his mission, voluntarily laid down his power and retired into private life. All Sicily mourned his death which occurred in 337 B.C., and he was buried at the expense of the city.

Timor, the largest and most eastern of the Lesser Sunda Islands, in the Asiatic Archipelago, south-east of Celebes, is politically divided between Holland and Portugal; area, 11,000 square miles. The coast is rocky, but has two safe harbours; Koepang on the south, the head-quarters of the Dutch, and Dilli on the north, the chief station of the Portuguese portion. The island is mountainous, and has frequently suffered from earthquakes. The plains produce tropical products in abundance, and the mountain slopes are covered with the fruits of Southern Europe. Agriculture is little attended to. The natives are partly Papuans, partly Malays. The trade, chiefly in the hands of Chinese, is carried on mostly through Koepang. The exports are sandal-wood, trepang, wax, horses, tortoise-shell, birds'-nests, &c. Pop. about 500,000.

Timor Laut, or **TENIMBER ISLANDS**, a group of islands of the Indian Archipelago lying between Timor and New Guinea. The largest, Timor Laut or Yamdena, is about 75 miles long by 25 broad, and is ill supplied with water. The natives resemble those of New Guinea. Pop. 15,000.

Timothy, a disciple of St. Paul, was born in Lycaonia, Asia Minor, probably at Lystra, of a Gentile father and Jewish mother. When St. Paul visited Lystra on his second missionary journey, Timothy became an

active fellow-worker with the apostle, and he accompanied him and Silas in the further course of their mission. He went with Paul to Philippi and Berea, and remained alone in the latter city, afterwards rejoining the apostle at Athens, from which city he was sent to Thessalonica. After remaining there some time he again joined Paul at Corinth. Five years later, he is found with his master at Ephesus, whence he was sent with Erastus into Macedonia and Achaia to prepare the churches for Paul's meditated visit. Timothy met the apostle again in Macedonia, and preceded him on his journey to Jerusalem. He again appears at Rome with Paul at the time when the epistles to the Colossians, Philippians, and Philemon were written. Timothy was on one occasion left at Ephesus when Paul went into Macedonia (1 Tim. i. 3). Tradition makes him the first bishop of Ephesus. He is said to have been martyred in the reign of Domitian or Nerva.

Timothy, EPISTLES TO, two books of the New Testament attributed to St. Paul. These epistles, along with that to Titus, are called the pastoral epistles, as to the genuineness of which there has been considerable controversy. By the early Christian fathers they were almost universally accepted as genuine, and their genuineness is also supported by external testimony. They were, however, rejected by Marcion, Basilides, and other Gnostic heretics. In modern times both views have been ably advocated. Their genuineness is chiefly attacked on the grounds that their style differs from that of the acknowledged epistles of St. Paul, that the heresies alluded to in the epistles betray a later age, that the ecclesiastical polity of the epistles is too complete to belong to the time of the apostles, and that it is difficult to find any part of the apostle's life to which they can be assigned. Biblical critics generally meet the last difficulty by assigning them to a period after the close of the narrative in the Acts, the second epistle to Timothy being written while St. Paul was undergoing a second imprisonment in Rome.

Timothy-grass (*Phleum pratense*), a hard coarse grass with cylindrical spikes from 2 to 6 inches long. It is used mixed with other grasses for permanent pasture, and grows best in tenacious soils. It is extensively cultivated throughout Great Britain, and also in North America. Timothy Hanson first recommended it, hence its name. Swine refuse it.

Timur, called also **TIMUR BEG** and **TIMUR LENK** (that is, *Timur the Lame*), and, by corruption, **TAMERLANE**, a celebrated oriental conqueror of Mongol or Tartar race, born in the territory of Kesh, near Samarcand, in 1336. His ancestors were chiefs of the district, and Timur by his energy and abilities raised himself to be ruler of all Turkestan (1370). By degrees he conquered Persia, and the whole of Central Asia, and extended his power from the great wall of China to Moscow. He invaded India (1398), which he conquered from the Indus to the mouths of the Ganges, massacring, it is said, on one occasion 100,000 prisoners. On his way from India to meet the forces of Bajazet, the Turkish sultan, he subjugated Bagdad, plundered Aleppo, burned down the greater part of Damascus, and wrested Syria from the Mamelukes, after which he overran Asia Minor with an immense army. Bajazet's army was completely defeated on the plain of Ancyra (Angora) in 1402, and the sultan was taken prisoner. The conquests of the Tartar now extended from the Irish and Volga to the Persian Gulf, and from the Ganges to the Grecian Archipelago. He was making mighty preparations for an invasion of China when death arrested his progress at his camp at Otrar, beyond the Sir-Daria, in 1405, and his empire immediately fell to pieces. He was fanatical in his religion, and although no conquests were ever attended with greater cruelty, devastation, and bloodshed, he was in a measure a patron of science and art, and is also reputed author of the Institutions of Timur and the Autobiography of Timur, both translated into English.

Tin, a hard, white, ductile metal; atomic weight 119; chemical symbol Sn (from *L. stannum*). Tin appears to have been known in the time of Moses; and the Phœnicians traded largely in the tin ores of Cornwall. The mountains between Galicia and Portugal, and those separating Saxony and Bohemia, were also productive of tin centuries ago, and still continue unexhausted. Tin occurs in the Malay Peninsula, the island of Banca, India, Mexico, Chili, Peru, the U. States, Australia, &c. There are only two ores of tin: the native dioxide, called *tin-stone* or *cassiterite*; and the double sulphide of tin and copper, called *tin-pyrites*. The former is the only ore used for obtaining metallic tin. It occurs either in the massive form or as distinct quadratic crystals which have a dark-brown colour and

metallic lustre. It is usually contaminated with sulphide of copper, arsenical pyrites, and tungsten compounds. It is found in veins in metamorphic or igneous rocks, such as granite, porphyry, slate, &c., and is then known as *mine-tin*, or sometimes in alluvial deposits formed by the denudation of the above veins, and is then known as *stream tin*. The ore is first ground and washed, and then roasted in a reverberatory furnace to expel the sulphur and arsenic. Mixed with limestone and fuel, it is again fused in a furnace for about eight hours, the earthy matters forming a slag with the lime, while the oxide of tin, reduced to a metallic state, falls by its own weight to the bottom, and is drawn off. The tin, still impure, is again moderately heated, when it melts and flows off into the refining basins, leaving the greater part of the foreign metals in a solid state. The molten tin is stirred with a wooden pole, and, when partially cool, it separates in zones, the upper consisting of nearly pure tin, while the under is so impure that it must be melted again. The upper layer is removed, cast into blocks, and sold as *block-tin*, the purest specimens being called *refined-tin*. Pure tin has a fine white colour like silver. It has a slightly disagreeable taste, and emits a peculiar sound when rubbed. Its hardness is between that of gold and lead, and it is very malleable. Specific gravity 7.29. Melting point about 233° C. Tin is very flexible, and when bent emits a crackling sound, sometimes called the *cry of tin*. It loses its lustre when exposed to the air. At very low temperatures it passes spontaneously into another modification known as *gray-tin*; this has a specific gravity 5.8, and falls to a powder. Ordinary tin can be rolled out into very thin sheets known as *tin-foil*. Oxygen combines with tin, forming protoxide of tin or *stannous oxide* (SnO), and dioxide or *stannic oxide* (SnO_2). The compounds of chlorine with tin are dichloride or *stannous chloride* (SnCl_2), and *stannic chloride* (SnCl_4). Stannic chloride has long been known as the *fuming liquor of Libavius*, so called from Libavius, a chemist of the 16th century. *Stannic sulphide* (SnS_2) has long been known in chemistry as *aurum mosaicum* or *mosaic gold*. Tin unites with arsenic and with antimony, but not readily with iron. Alloyed with copper it forms bronze, bell-metal, and several other useful alloys. With lead it forms pewter and solders of various kinds. *Tin-*

plate is formed by dipping thin steel plates into melted tin after being coated with a layer of grease; they are afterwards rolled and the grease removed by bran. Tin is principally employed in alloys. Its oxides are used in enamelling, and for polishing metals, and its solution in nitro-muriatic acid is an important mordant in dyeing, rendering several colours, particularly scarlet, more brilliant and permanent.

Tin'amou, a genus and family of South American birds allied in some respects to the ostrich and emeu. They somewhat resemble



Great Tinamou (*Tinamus brasiliensis*).

a partridge, and vary in size from that of a pheasant down to that of a quail. The great tinamou (*Tinamus brasiliensis*) is about 18 inches long, and inhabits the forests of Guiana.

Tinavelly. See *Tinneveli*.

Tincal, the commercial name of borax in its crude or unrefined state. See *Borax*.

Tincture, a spirituous solution of the active principles of some vegetable or other medicinal substance.

Tin'dal, MATTHEW, English controversial writer, born about 1657, entered Lincoln College, Oxford, in 1672, became a fellow of All Souls', and received the degree of LL.D. After the revolution he sat as a judge in the Court of Delegates. In 1706 he published a treatise entitled the Right of the Christian Church, attacking hierarchical supremacy. This work excited the animosity of the high church clergy, and the House of Commons ordered it, together with two defences of it written by Tindal, to be burned by the common hangman. In 1730 he published his most famous work, Christianity as Old as the Creation, or the Gospel a Republication of the Religion of Nature, in which he maintains that there has been no

revelation distinct from the internal revelation of the law of nature in the hearts of mankind. He died in 1733.

Tindall, or **TYNDALE**, **WILLIAM**, a martyr to the Reformation, born about 1490-95 in Gloucestershire, and educated at Oxford. After taking orders he went as a tutor to Gloucestershire, where, in consequence of his opinions in favour of the reformation doctrines, he was reprimanded by the chancellor of the diocese. He then removed to London, where he probably began his English version of the New Testament, and subsequently proceeded to Germany, visiting Luther at Wittenberg. Having completed his translation he got it partly printed in quarto at Cologne; but he had to flee from this town, and the complete work was printed in octavo at Worms. The greater part was sent to England, and the prelates Warham and Tunstall collected all copies they could seize or purchase, and committed them to the flames. The only fragment of the quarto edition known to exist is preserved in the British Museum. Of the first octavo edition only two copies remain, one in the Baptist College at Bristol, the other (imperfect) in the library of the Chapter of St. Paul's. Revised editions were soon issued by Tindall himself. Tindall also translated the Pentateuch, and subsequently Jonah. In 1530 he took up his residence at Antwerp. In 1535 he was thrown into prison at Vilvorde near Brussels, and being found guilty of heresy he was strangled in 1536 and his body burned at the stake. Tindall's translation of the Scripture is highly esteemed for perspicuity and noble simplicity of idiom.

Tinder, any substance artificially rendered readily ignitable but not inflammable. Before the invention of chemical matches it was the chief means of procuring fire. The tinder, ignited by a spark from a flint, was brought into contact with matches dipped in sulphur. Tinder may be made of half-burnt linen, and of various other substances, such as amadou, touchwood, or German tinder (which see).

Tinea. See *Ring-worm*, also *Clothes-moth*.

Tin-foil, pure tin, or an alloy of tin and lead, beaten into leaves about $\frac{1}{100}$ th part of an inch thick. It is often used to cover up articles that are not to be exposed to atmospheric moisture.

Tinneveli, a town in the south-east of India, in the presidency of Madras, the

largest town of the district of the same name, the administrative head-quarters of which are at Palamkotta (which see) on the other side of the Tambraparni river. It has an interesting ancient temple and is an active Protestant missionary centre. Pop. 40,469.—The district, which occupies the extreme south-eastern corner of the Indian peninsula, has an area of 5381 sq. miles, and pop. 1,916,095.

Tinning, the process of covering or coating other metals with a thin coat or layer of tin, to protect them from oxidation or from corrosion by rust.

Tinos, or **TINO** (anciently *Tenos*), an island in the Grecian Archipelago, one of the Cyclades, immediately south-east of Andros; area, about 85 square miles. It produces barley, silk, wine, figs, oranges, and honey. There is a town of the same name near the south coast. Pop. of the island, 12,800; of the town, 2415.

Tin-plate. See *Tin*.

Tintoretto, the surname of a Venetian historical painter, **GIACOMO** or **JACOPO ROBUSTI**, born at Venice in 1518, died there in 1594. He studied for a few days under Titian, but, being dismissed without explanation by his master, he afterwards pursued his studies alone, and endeavoured, according to his own motto, to unite Titian's colouring with the drawing of Michael Angelo. He painted many works for his native city, among which are a Last Judgment, the Israelites worshipping the Golden Calf, a Crucifixion, the Marriage of Cana, the Miracle of St. Mark, or *Miracolo dello Schiavo* (his masterpiece), &c. His portrait, by himself, is in the Louvre; and there are many of his paintings in Germany, Spain, France, and England. Equal in several respects to Titian or Paul Veronese, he wants the dignity of the former, and the grace and richness of composition of the latter. His manner of painting was bold, with strong lights, opposed by deep shadows. His execution was very unequal.

Tip'perah, a district of British India, in the Chittagong division of E. Bengal; area, 2491 square miles. Pop. 1,782,935.

Tipperary, an inland county in Ireland, in the province of Munster, bounded by King's County, Queen's County, Kilkenny, Waterford, Cork, Limerick, Clare, and Galway; area, 1659 square miles, or 1,061,731 acres, of which a fourth is under tillage. The principal mountain-groups are the Knockmeledown, the Galtees, and the Keeper and

Devil's Bit Mountains; the greatest elevation being 3000 feet. The soil is extremely fertile; the chief crops are oats, potatoes, and wheat. The level country forms part of the great central plain of Ireland, and includes some branches of the Bog of Allen. Mineral productions comprise coal, copper, zinc, and argentiferous lead; slates of good quality are extensively raised near Killaloe. Grazing is the principal employment, and there are numerous dairies. Tipperary now returns four members to parliament. Chief towns: Clonmel, Carrick-on-Suir, Nenagh, Thurles, Cashel, Tipperary, and Roscrea. Pop. 159,754.—TIPPERARY, the county town, situated on the river Arra, 98 miles s.w. of Dublin, has an endowed grammar-school, a convent, town-hall, a butter-market, and a corn and provision market. The chief trade is in butter. Recently an embittered feeling of tenants towards their landlord led to the erection of a quarter called 'New Tipperary,' which, however, has latterly been abandoned. Pop. 6281.

Tippoo Saib, Sultan of Mysore, son of Hyder Ali, born in 1749, succeeded his father in 1782. (See *Hyder Ali Khan*.) He continued the war in which his father was engaged with the British, and abandoned the Carnatic in order to check the British advance on the Malabar coast. In April, 1783, he forced the British commander Matthews to surrender at Bednore. Matthews and a part of the garrison were put to a shameful death. Mangalore also fell into his hands; but in March, 1784, being deprived of the assistance of the French by the Treaty of Versailles (Sept. 1783), he was induced to sign the Treaty of Mangalore on advantageous terms. In 1789 he attacked the Rajah of Travancore, an ally of the British. An offensive and defensive alliance was concluded (June, 1790) between the East India Company, the Peishwa of the Mahrattas, and the Nizam. In the campaign of 1790 and 1791 several places were reduced by the allies, and Tippoo was finally besieged in his capital, Seringapatam. By a peace concluded in Feb. 1792, the sultan agreed to relinquish half his territory and to pay 33,000,000 rupees. But Tippoo was unwilling to submit to this loss and entered into negotiations with the French. Suspecting that Tippoo's preparations were connected with Bonaparte's invasion of Egypt, the Company determined to anticipate hostilities, and on the 22d Feb. 1799, in connection with their allies,

they declared war against the sultan. Tippoo was defeated in two battles, and retreated to Seringapatam. On May 4th General Baird reduced the place by storm, and Tippoo perished in the assault.

Tipton, a town in Staffordshire, England, 1½ miles from Dudley, and within the parliamentary limits of the borough of Wednesbury. It has no important public buildings. It depends chiefly on its manufactures of heavy iron goods. Pop. 30,543.

Tip'ula, a genus of dipterous insects or flies, of which the great crane-fly (*T. gigantea*) is a typical species. See *Crane-fly*.

Tirailleurs (ti-rá-yeur), a French name given to a species of infantry, intended to fight mostly dispersed, two and two always supporting each other, and in general to skirmish in front of the columns and troops of the line.

Tiraspol, a town of S. Russia, gov. Khereson, on the Dniester. Pop. 24,898.

Tiree, or **TYREE**, an island of the Hebrides, belonging to Argyleshire. It is about 14 miles long, and reaches 6 in breadth, is generally low, flat, and fertile, but has several heights of 400 feet. Agriculture and fishing are the leading industries. Pop. 2192.

Tirhoot, or **TIRHUT**, formerly a large division of Bengal, British India.

Tirlemont (tírl-món), a town of Belgium, in South Brabant. It has a church dating from the 9th century, and manufactures of woollens, breweries, and a large trade. Pop. 17,582.

Tirnau, a royal free town of Hungary, county of Pressburg. Pop. 13,181.

Tir'nova, or **TER'NOVA**, a town of Bulgaria, on the Jantra, 76 miles w. of Shumla. It is the see of a Greek bishop. There are manufactures of silk and coarse cloth. Pop. 14,000.

Tirol. See *Tyrol*.

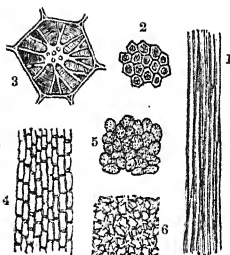
Ty'ryns, a very ancient ruined city of Greece, in the Peloponnesus, in the plain of Argolis, about 3 miles from the sea, with remains of Cyclopean walls, and of a palace of the 11th or 10th century B.C., excavated by Schliemann.

Tischendorf (tish'en-dorf), **LOBEGOTT FRIEDRICH KONSTANTIN**, German biblical critic, born in 1815, studied at Leipsic, and in 1845 became professor extraordinary there, becoming professor ordinary of theology in 1859. He made several visits to the East, and brought back valuable MSS., the most remarkable being (in 1859) the famous Sinaitic Codex (which see). *Tischen-*

dorf was continually engaged in editorial labours, and was broken down by overwork in 1873. He died at Leipsic in 1874.

Tisio. See *Garofalo, Benvenuto*.

Tissues, (1) in animal anatomy, the texture or grouping of anatomical elements of which the systems of organs are composed. Thus in special histology we speak of *muscular tissue*, or flesh; *osseous tissue*, or bone; *adipose tissue*, or fat; *cartilaginous tissue*.



Vegetable Tissue.

1, Prosenchyma or Woody Tissue. 2, Horizontal section of Prosenchymatous Tissue. 3, Do. do. of a Single Cell, showing the successive layers of deposit in the interior which give hardness and firmness to the wood of plants. 4, Cylindrical Parenchyma. 5, Round or Elliptical Parenchymatous Tissue. 6, Spongiform or Stellate Tissue.

or gristle; *pigmentary tissue*, or colouring matter seen in the skin, &c.; *arcular, cellular*, or *connective tissue*, widely distributed in every part of the body, and serving to bind together and consolidate other parts and tissues. (2) In vegetable anatomy, the minute elementary structures of which the organs of plants are composed. Plant tissues are composed of elementary membrane and elementary fibre, and the principal forms under which they exhibit themselves constitute *cellular tissue*, *fibrous tissue*, and *vascular tissue*.

Tit. See *Titmouse*.

Titania. See *Mab*.

Titanium, an element discovered in 1791. Symbol Ti, atomic weight 48.1. It is found combined with oxygen in several minerals, and especially in iron ores, known as titaniferous iron ores. It is a dark-gray, very heavy, amorphous powder, in many respects resembling silicon. Its oxide forms the minerals *rutile*, *anatase*, and *brookite*. The ores include menachanite, from Menachan in Cornwall, where it was originally found; iserine, from the river Iser in Silesia; &c.

Titans, in Greek mythology, the sons and daughters of Urānus (Heaven) and Ge (Earth). They were twelve in number, six

sons and six daughters. They rose against Urānus and deposed him, raising Cronus, one of their number, to the throne. They were afterwards overcome by Zeus, and thrown into Tartarus.

Tithes (Anglo-Saxon, *teótha*, 'a tenth part'), the tenth part of the increase yearly arising from the profits of lands, the stock upon lands, and the industry of the occupants, allotted to the clergy for their maintenance. The custom of giving and paying tithes is very ancient, and was legally enjoined by Moses (Lev. xxvii., Deut. xiv., and elsewhere). In 778 Charlemagne established the payment of tithes in those parts of the Roman Empire under his sway, dividing them into four parts: one to maintain the edifice of the church, the second to support the poor, the third the bishop, and the fourth the parochial clergy. Similar laws were afterwards enacted in various states of Western Europe. Their payment was first enjoined in England by a constitutional decree of a synod held in 786. Offa, king of Mercia, in 794 made a law giving the tithes of all his kingdom to the church, and similar laws were enacted by Athelstan and Canute. The first mention of tithes in statute law is in 1285. In the earliest arrangement a man might give the tithes to what priests he pleased, which were called *arbitrary consecrations of tithes*; but when dioceses were divided into parishes, the tithes of each parish were allotted to its own particular minister. It is now generally held that tithes are due of common right to the parson of the parish, unless there be a special exemption. The parson of the parish may be either the actual incumbent or else the appropriator of the benefice. (See *Impropriations*.) Tithes in English law are of three kinds: 1, *prædial*, arising immediately from the soil, as corn, hay, fruit, &c.; 2, *mixed*, such as calves, lambs, pigs, fowls, wool, &c.; 3, *personal*, arising from the profits of personal industry in a trade, profession, or occupation. They are divided into *great* and *small*. Great tithes are chiefly corn, hay, and wood, and belong to the rector; small tithes are chiefly mixed and personal tithes, and belong to the vicar. Originally all the land of the kingdom, except crown and church lands, was tithable. By acts passed in the reign of Henry VIII., however, tithes could be temporarily redeemed by the payment of a lump sum. The circumstance that tithes were exacted from dissenters and the difficulties of col-

lecting them, long led to constant bickerings between the clergy and the people. The popular demand for a measure of commutation was at last met by the Tithe Commutation Act (1836). This act, amended by subsequent statutes, provides for the conversion of all the uncommuted tithes in England and Wales into a corn and rent charge, payable in money, and estimated on the average price of a bushel of corn for the seven years ending at the preceding Christmas. In Ireland the tithes were commuted into a money rent charge in 1838, which by the Irish Church Act of 1869 was vested in the commissioners of church temporalities, with power to sell such rent charge at 22½ years purchase to the landowner. The tithes in Scotland are called *teinds* (which see).

Tithing, an ancient subdivision of England, forming part of the hundred, and consisting of ten householders and their families held together in a society, all being bound for the peaceable behaviour of each other, the chief of whom was the *tithing-man*.

Tithonus, in Greek mythology, a son, or brother, of Laomedon, king of Troy. He was beloved by Eos (Aurora, Morning), who importuned Zeus to make him immortal. Her prayer was granted, but she had neglected to ask for continual youth, and in time her lover took on all the signs of extreme age. Tithonus' prayer to the gods to be relieved of the burden of old age was answered by his being metamorphosed into a grasshopper.

Titian (tish'i-an), or TIZIANO VECELLIO (tit-si-ä'no ve-chel'li-ö), one of the most distinguished of the great Italian painters, and head of the Venetian school, was born at Pieve de Cadore, in the Carnio Alps, in 1477. He studied under Giovanni Bellini of Venice, and in 1507 was associated with the painter Giorgione in executing certain frescoes. In 1511 he was invited to Padua, where he executed three remarkable frescoes still to be seen. In 1512 he completed the unfinished pictures of Giovanni Bellini in the Sala del Gran Consiglio at Venice, and the senate were so pleased that they gave him an important office. To this period are attributed his pictures of the Tribute Money and Sacred and Profane Love. In 1514 he painted a portrait of Ariosto at Ferrara, and after his return to Venice he painted an Assumption of the Virgin (1516), considered one of the finest pictures in the world; it is now in the Academy of the

Fine Arts in Venice. About 1528 he produced his magnificent picture, 'The Death of St. Peter the Martyr'—'a picture,' says Algarotti, 'in which the great masters admitted they could not find a fault,' unfortunately destroyed by fire in 1867. In 1530 the Emperor Charles V. invited him to Bologna to paint his portrait and execute various other commissions. In 1532 he again painted the emperor's portrait, and he is said to have accompanied Charles to



Titian.

Madrid, where he received several honours. He remained, it is said, three years in Spain, in which country many of his master-pieces, such as *The Sleeping Venus*, *Christ in the Garden*, *St. Margaret and the Dragon*, are still to be found. In 1537 he painted an *Annunciation*, and in 1541 he produced *The Descent of the Holy Ghost on the Apostles*, *The Sacrifice of Abraham*, and *David and Goliath*. In 1543 he painted his picture of *The Virgin and San Tiziano*; and in 1545 he visited Rome, where he painted the famous group of *Pope Paul III., the Cardinal Farnese, and Duke Ottavio Farnese*. He was patronized as warmly by Philip II. as by his father Charles V. Of Titian's private life but little is known. He died of the plague in 1576, aged ninety-nine, having painted to the last with almost undiminished powers. Titian excelled as much in landscape as in figure-painting, was equally great in sacred and profane subjects, in ideal heads and in portraits, in frescoes and in oils; and though others may have surpassed him in single points, none equalled him in general mastery. As a colourist he is almost unrivalled, and his pictures often reach the perfection of sensuous beauty.

Titica'ca, a lake on the north-western frontiers of Bolivia, situated in a valley of the Andes 12,600 feet above sea-level; estimated area, 5300 square miles. It contains several islands, and abounds with fish.

Titlark. See *Pipit*.

Title-deeds, in law, are the documentary evidences of ownership of real property.

Titles of Honour, appellations given to certain persons in virtue of particular offices or dignities possessed by them, or as marks of distinction and special rank. They have existed probably among all peoples. Such were in Rome the titles *Magnus* (Great) and *Africanus* (African); and the epithets *Cæsar*, the name of a family, and *Augustus*, which were gradually applied to all who filled the imperial throne. See *Nobility, Britain, section Ranks and Titles, and Address (Forms of)*.

Titling. See *Pipit*.

Titmouse, **TIT**, or **TOMTIT**, the name given to a number of denti-rostral inessorial birds inhabiting most parts of the world. They are very active little birds, continually flitting from branch to branch, devouring seeds



Blue Titmouse, male and female (*Parus caeruleus*).

and insects and not sparing even small birds when they happen to find them sick and are able to put an end to them. Their notes are shrill and wild. They build in the hollows of trees, in walls, &c. The great titmouse (*Parus major*) is between five and six inches long, and inhabits Britain and Europe generally. Other British species are the blue titmouse (*P. caeruleus*), the long-tailed tit (*P. caudatus*), the coal-tit (*P. ater*), and the marsh-tit (*P. palustris*). The crested titmouse (*P. cristatus*) and the bearded titmouse (*P. biarmicus*) are comparatively rare in England, but common on the Continent. Several species are N. American, some of them known as *chickadee* (which see).

Titration, a method adopted in chemical

analysis. It consists in running a solution of known strength from a burette into a given volume of a solution of the substance to be analysed. The completion of the reaction between the two solutions is determined usually by a change of colour, often of a third substance, *e.g.* litmus, which is termed an indicator.

Titus, or in full, **TITUS FLAVIUS SABINUS VESPASIANUS**, a Roman emperor, born A.D. 40, was the eldest son of the Emperor Vespasian. He served with credit as a military tribune in Germany and Britain, and accompanied his father in the war against the Jews as commander of a legion. When Vespasian became emperor (69) Titus was left to conduct the war in Judæa. He took Jerusalem (A.D. 70), and after visiting Egypt returned to Rome in triumph, and was associated with his father in the government of the empire. He became sole emperor in 79, and showed himself as an enlightened and munificent ruler, distinguished by benevolence and philanthropy. He died on the 13th Sept. 81, after a reign of a little over two years and two months. His brother Domitian was strongly suspected of having poisoned him.

Titus, a disciple and assistant of the apostle Paul, and the person to whom one of the canonical epistles of the New Testament is addressed. He was a gentile by origin, and probably a native of Antioch. He laboured with Paul in Asia Minor, Macedonia, and Crete, and is said to have been the first Christian bishop of Crete.

Titus, **EPISTLE TO**, one of the three pastoral epistles of the New Testament (the remaining two being those addressed to Timothy), believed to have been written by St. Paul after his first imprisonment at Rome. The topics handled are the same which we find in the other two kindred epistles. See *Timothy, Epistles to*.

Titus Livius. See *Livius*.

Titusville, a city of the United States, in Crawford County, Pennsylvania. It stands upon Oil Creek, in the midst of the oil regions of N. W. Pennsylvania. The refining of petroleum is the leading industry. Pop. 8244.

Timen, a town in the government of Tobolsk, Western Siberia, on the Tura, an affluent of the Tobol. It is the centre of the Western Siberian trade, and has various manufactures. Pop. 30,000.

Tiverton, a municipal borough of England, in the county of Devon, pleasantly

situated 12 miles north by east of Exeter. It consists of several well-formed streets, and has a spacious market-place, guildhall, assembly-rooms, public baths, &c.; and important manufactures of lace. Since 1885 it has given name to the Tiverton or north-eastern parliamentary division of the county of Devon. Pop. 10,382.

Tivoli (the ancient *Tibur*), a town of Central Italy, 17 miles E.N.E. of Rome (connected by tramway), on the left bank of the Tevere (or Anio), which here forms fine falls. It has steep, narrow, and ill-paved streets, and houses in general poorly built, but has a handsome modern cathedral. It is lighted by electricity from the falls. Among ancient remains are the circular temple of the Sibyl, the ruins of Hadrian's villa, &c. Pop. 10,000.

Tiziano. See *Titian*.

Tlaxcala, a state of Mexico, surrounded nearly on all sides by the state of Puebla; area, 1620 sq. miles; pop. 172,315. The capital, which bears the same name, was once an important city. Pop. about 5000.

Tlemcen, a town of Algeria, in the province of Oran, 70 miles S.S.W. of the city of that name, finely situated 2500 feet above the sea, in the midst of olive groves, vineyards, and orchards. Its chief buildings are some fine mosques. Pop. 32,400.

Toad, the name applied to various genera of tailless amphibians. Toads have a thick bulky body, covered with warts or papillæ. They have no teeth, and the tongue is fixed to the front of the mouth, but the posterior extremity is free and protrusible. The hind feet are but slightly webbed. They leap badly, and generally avoid the water, except in the breeding season. Their food consists of insects and worms. Toads have a most unprepossessing aspect and outward appearance. The bite, saliva, &c., of the common toad of Europe (*Bufo vulgaris*) was formerly considered poisonous, but no venom or poison apparatus of any kind exists in these creatures. Besides the common toad, the natterjack (*B. calamita*) is the only British species. (See *Natterjack*.) The toad is easily tamed, and exhibits a considerable amount of intelligence as a pet. It lies torpid in some hole during winter. Insects are caught by a sudden protrusion of the tongue, which is provided with a viscous secretion. There are some ten species of toads in N. America. The Surinam toad is described in the article *Pipa*. The toad is extremely tenacious of

life, but experiments have conclusively shown that there is no truth in the oft-repeated stories of the creature being able to support life when inclosed in solid rock for immense periods of time. Dr. Buckland has shown that when excluded from air and food, frogs and toads, in virtue of their slow circulation and cold-blooded habits, might survive about a year or eighteen months at most.

Toad-fish, a name sometimes given to the *Lophius piscatorius*. See *Angler*.

Toad-flax, the English name of various plants of the genus *Linaria*, order Scrophulariaceæ. The common toad-flax is *L. vulgaris*, which in its general habits is not unlike flax. The flowers are of a bright yellow; the corolla labiate, resembling that of snapdragon in shape, but provided with a long spur. It grows in hedges and fields, and is a reputed purgative and diuretic. The ivy-leaved toad-flax (*L. Cymbalaria*) is often found trailing over old walls. Allied to this genus is the *Antirrhinum* (which see).

Tobacco, a very important plant, belonging to the natural order Atropacæ, or nightshade order. The introduction of the use of tobacco forms a singular chapter in the history of mankind. According to some authorities smoking was practised by the Chinese at a very early date. At the time of the discovery of America, tobacco was in frequent use among the Indians, and the practice of smoking, which had with them a religious character, was common to almost all the tribes. (See *Calumet*.) The name *tobacco* was either derived from the term used in Hayti to designate the pipe, or from Tabaca in St. Domingo, whence it was introduced into Spain and Portugal in 1559 by a Spaniard. It soon found its way to Paris and Rome, and was first used in the shape of snuff. Smoking is generally supposed to have been introduced into England by Sir Walter Raleigh, but Camden says the practice was introduced by Drake and his companions on their return from Virginia in 1585. It was strongly opposed by both priests and rulers. Pope Urban VIII. and Innocent IX. issued bulls excommunicating such as used snuff in church, and in Turkey smoking was made a capital offence. In the canton of Bern the prohibition of the use of tobacco was put among the ten commandments, immediately after that forbidding adultery. The *Counterblast* or denunciation written by James I. of England is a matter of history. All prohibitions, however, regal or priestly, were of

no avail, and tobacco is now the most extensively used luxury on the face of the earth. The most commonly cultivated tobacco plant (*Nicotiana tabacum*) is glutinous, and covered with a very short down; the stem upright, 4 or 5 feet high, and branching; the leaves are lanceolate, from 6 to 18 inches long; the flowers are terminal and rose-coloured. A less esteemed species is *N. rustica*, distinguished by a short yellowish-green corolla. The best Havana cigars are made from the leaves of *N. repanda*. All the tobacco plants are natives of America, and that continent has continued the principal producer, the chief tobacco-growing country being the U. States, and the chief localities being Virginia and Kentucky. It was first cultivated in Holland early in the 17th century, and soon extended to other countries, including Austria, Germany, Russia, the Balkan Peninsula, Asiatic Turkey, France, British India, Cuba, Brazil, the Philippine Islands, Japan, and Australia. The cultivation in Britain was forbidden from an early date till 1866, when it was permitted under certain conditions. Tobacco owes its principal properties to the presence of a most poisonous alkaloid named nicotine (see *Nicotine*). In the cultivation of tobacco the object is to render the leaves as large and as numerous as possible. When the leaves become brittle the plants are cut close to the ground, and afterwards carried to the drying-shed, where they are hung up in lines to sweat and dry. When perfectly dry the leaves are stripped from the stalks and made into small bundles, which are subsequently stowed in casks for exportation. In the manufacture of tobacco the leaves are first thoroughly cleansed with salt and water. The midrib of the leaf is then removed; the leaves are again sorted, and the large ones set apart for making cigars. The leaves may either be cut finely for use in pipes, as is the case with *shag* tobacco, or they are moistened and pressed into cakes, which are desig-



Virginian Tobacco (*Nicotiana glauca*).

nated *cavendish*; or they are pressed into sticks, as *negrohead*; or again the leaves may be spun in the form of a rope of greater or less thickness; the smallest twist is called *pigtail*. The midribs, separated in the first process of manufacture, are preserved to be converted into snuff. (See *Snuff*.) Cigars and cheroots are favourite forms of manufactured tobacco. As the best leaf is grown in Cuba, so also are the best cigars made there. Most of the tobaccos used by British smokers are mixtures of different growths. The leaf used for the manufacture of Manilla cheroots is grown chiefly on the island of Luzon. In Britain the duty on tobacco is higher in proportion to the intrinsic value of the article than that imposed on any other import. The value of the best leaf ranges from 8d. to 9d. per lb., and the duty on unmanufactured tobacco, containing 10 per cent or more of moisture, is 3s. per lb., if containing less than 10 per cent, 3s. 4d. On manufactured tobacco the duties are higher, being on cavendish or negrohead, 4s. 4d.; on the same manufactured in bond, 3s. 10d.; on cigars, 6s.; on cigarettes, 4s. 10d. The gross receipts of customs duties on tobacco in 1905 amounted to £13,902,398. The total imports of unmanufactured tobacco into Britain in 1905 were 83,176,913 lbs., valued at £2,236,104; manufactured, 3,691,687 lbs., valued at £1,485,816. The United States exports tobacco annually to the value of more than 30,000,000 dols. The total crop in the United States is estimated at about 600,000,000 lbs. annually, the half being exported.

Tobacco-pipe. See *Pipe* (Tobacco).

Toba'go, an island of the British West Indies, belonging to the Windward group, 24 miles north-east of Trinidad; area, 114 square miles. Two-thirds of the island are covered with primeval forests, and out of a total area of 73,313 acres, only about 10,000 acres are cultivated. Sugar, rum, molasses, and cocoa-nuts are the chief productions; but attention is now being turned to the cultivation of cocoa and coffee, for which the soil and climate are admirably adapted. This island is one of the most healthy of the West Indies. Tobago was discovered by Columbus in 1496, and was ceded to Great Britain by France in 1763. Principal town, Scarborough. Pop. 13,750.

Tobit, BOOK OF, one of the Old Testament apocryphal books, rejected by the Jews and Protestants, but included in the Roman Catholic canon. It contains an account of

some remarkable events in the life of Tobit, a Jew of the tribe of Naphtali, carried captive to Nineveh, and his son Tobias.

Tobol, a river of Siberia, which rises in the west slope of the Ural Mountains, in the government of Orenburg, and joins the Irtysh at the town of Tobolsk, after a course of about 550 miles.

Tobolsk, capital of the government of Tobolsk, Western Siberia, on the Tobol where it joins the Irtysh. It has a cathedral, arsenal, barracks, prison for Siberian exiles, a theatre, &c. Pop. 20,130.—The government comprises the north-western part of Siberia, and has an area of 564,825 square miles, and a pop. of 1,444,500.

Tocantins, a river of Brazil, which rises in lat. 14° s., flows northward, receives the Araguay, and enters the Atlantic by the Pará estuary, forming one mouth of the Amazon. The entire course is 1590 miles, and is navigable for 1080; but navigation is much impeded by sand-banks and rapids.

Tocqueville (tok-vèl), ALEXIS CHARLES HENRI CLEREL DE, French writer, born in 1805, died 1859. Being commissioned by the government to proceed to the United States to report upon the penitentiary system, the results of his inquiry were published in 1833 under the title *Du Système Pénitentiaire aux Etats-Unis et de son Application en France*. His most celebrated work, however, was *La Démocratie en Amérique* (Democracy in America, two vols. Paris, 1834), which was translated into the principal European languages. In 1849 he accepted the portfolio of foreign affairs, but soon resigned it. After the *coup d'état* of 1851 he lived retired from public affairs. He wrote also *L'Ancien Régime et la Révolution*; *Histoire Philosophique du Règne de Louis XV.*; &c.

Todas, a race inhabiting the upper part of the Neilgherry Mountains in Southern India. They are few in number, and under the influence of polyandry and intemperance they are rapidly disappearing. Their language is Dravidian.

Toddy, the name given by the English to the sweet juices which are extracted from the different species of the palm tribe, including the cocoa-nut tree. When newly drawn from the tree it is a sweet, cool, refreshing beverage, but when it has been allowed to ten or twelve hours to ferment it becomes highly intoxicating. The name toddy is also given to a mixture of whisky, hot water, and sugar.

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Tod'hunter, ISAAC, M.A., F.R.S., was born at Rye in 1820; studied at University College, London, and afterwards graduated as senior wrangler at St. John's College, Cambridge, where he resided as fellow, tutor, and principal mathematical lecturer until his death in 1884. He wrote a series of popular text-books on mathematics, a *History of the Mathematical Theories of Attraction and the Figure of the Earth* (two vols., 1873), &c.

Todleben (tod'la-bén), FRANCIS EDWARD. COUNT, Russian general and military engineer, born 1818; died 1884. After leaving the schools of Riga he entered the College of Engineers at St. Petersburg, and served against the Circassians in 1848. In 1854 he took the chief part in the defence of Sebastopol, and after the peace of 1856 wrote a *Narrative of the War in the Crimea*. During the Russo-Turkish war Todleben was sent (in 1877) to reduce Plevna. The place was soon invested, and Osman Pasha, the Turkish commander, was compelled to surrender at discretion. For his services Todleben was created a count, and he subsequently became commander-in-chief of the Russian army in Turkey. He was afterwards appointed governor of Odessa, and later, of Wilna.

Todmor'den, a town of England, partly in Lancashire, partly in Yorkshire (West Riding), on the Calder, in a beautiful and romantic valley, 21 miles N.N.E. of Manchester. It has extensive manufactures of cotton goods. Pop. 25,419.

Tody, the name of certain tropical birds, genus *Todus*, family Todidæ. They are birds of gaudy plumage, and feed on insects, worms, &c. The most elegant species is the *T. regius* (royal or king today), a native of Cayenne and Brazil. The green today (*T. viridis*) is also a pretty bird, about the size of a wren. It is very common in Jamaica.

Tofana. See *Aqua Tofana*, Roman Senator wearing the Toga.

Toga, the principal outer garment of wool worn by Roman citizens. It covered the



TOGOLAND — TOLEDO.

whole of the body except the right arm, and it was originally worn by both sexes until the matrons adopted the *stola*. The *toga virilis*, or manly gown, was assumed by Roman youths when they attained the age of fourteen. The variety in the colour, the fineness of the wool, and the ornaments attached to it indicated the rank of the citizen; generally it was white. Under the emperors the toga went out of fashion.

Togoland, a German protectorate in W. Africa, Upper Guinea, acquired in 1885. It has a short coast-line, but stretches 200 miles inland; area, 33,000 square miles. A good trade is carried on. The capital and chief port is Lome. Pop. 1,500,000.

Toise (twîz), formerly in France the unit of length, equal to 6·39 English feet.

Toison d'or (twâ-son-dôr), an order of knighthood. See *Golden Fleece*.

Tokar, a town of the Eastern Soudan, south of Suakin. Pop. 20,000.

Tokat, a town of North-eastern Asia Minor, 75 miles south of the Black Sea, near the Yeshil Irmak. Pop. about 30,000.

Tokay, a town of Hungary, at the conflux of the rivers Theiss and Bodrog; pop. 4479. This town is celebrated for the wine grown in its vicinity, especially for a fine rich sweet variety. Inferior and imitation wines are often sold under this name.

Tokens, pieces of money current by sufferance, and not coined by authority; or coins only nominally of their professed value. In England tokens first came into use in the reign of Henry VIII., owing to the want of authorized coins of lower value than a penny. Stamped tokens of lead, tin, and even leather were issued by vintners, grocers, and other tradesmen during the time of Elizabeth, and were extensively circulated, being readily exchanged for authorized money at the shops where they were issued. A currency of this kind (mostly of copper) was much used in Britain towards the close of the eighteenth century.

Tokio, formerly called YEDDO, the capital of Japan, and chief residence of the mikado, is situated on a bay of the same name, on the S.E. coast of Hondo, the largest of the Japanese islands, and is connected by rail with Yokohama, Kanagawa, &c. The bulk of the houses are of wood, but there are many new buildings of brick and stone, and an imperial palace has recently been erected near the centre, as also public offices, &c. The greater part of the town is flat, and intersected by numerous canals crossed by

bridges. The streets are generally narrow and irregular. Gas and electricity have been introduced, and the sanitary arrangements have been improved. Education is



well organized, and there are many schools and academies, besides the imperial university. Tokio may be considered the centre of the political, commercial, and literary activity of Japan. Pop. 1,440,121.

Toland, JOHN, English deist, born in 1669; died 1722. He entered Glasgow University in 1687; graduated M.A. at Edinburgh in 1690, and afterwards studied theology at Leyden. In 1696 he published his *Christianity not Mysterious*, which created a great sensation, and was burnt by the hangman at Dublin by order of the Irish parliament in 1697. He subsequently settled down as a voluminous pamphleteer in London. Of his other works the chief were: *Life of Milton* (1698), accompanying an edition of his writings, *Anglia Libera* (1701), *Socinianism Truly Stated* (1705), and *Pantheisticon* (1750). In the last of these works Toland distinctly avowed himself a pantheist.

Toledo (anciently *Toletum*), a city of Spain, in New Castile, capital of a province of the same name, on a rocky eminence washed by the Tagus, and 1820 feet above the sea, 55 miles south-west of Madrid. It is the see of an archbishop, who is primate

TOLEDO — TOMAHAWK.

of Spain. The streets are narrow and steep, the houses crowded together and almost windowless next the street; but though gloomy it is one of the most interesting cities in Spain, and 'an epitome of its history'. Its chief glory is a Gothic cathedral, one of the grandest in the world, completed in 1492 in the style of the 13th century. The Toledo sword-blades, renowned for centuries, are manufactured (with cutlery in general) in a government establishment. Toledo was taken by the Romans in 193 B.C., and is celebrated in the history of Spain. It was successively the seat of government under the Goths, Moors, and kings of Castile. Pop. 23,375. Province; area, 5920 sq. miles. Pop. 376,814.

Toledo, a flourishing city of Lucas county, Ohio, United States, at the western extremity of Lake Erie, 65 miles s.s.w. of Detroit. Toledo is the terminus of the Miami and Erie, and the Wabash and Erie Canals, and the centre of several extensive railway lines. Exports include flour, grain, cattle, beef, pork, hides, wool, tobacco, and timber. There are large wagon-works, machine-shops, foundries, flour-mills, and manufacturing of tobacco, flax, cotton, and chandlery. Pop. 131,822.

Tolentino, a small town of Central Italy, in the province of Macerata, with a fine cathedral. Here Pope Pius VI., in 1797, concluded a humiliating peace with Bonaparte, and in the neighbourhood, in 1815, Murat, at the head of the Neapolitans, was defeated by the Austrians under Bianchi. Pop. 5000.

Toleration. See *Religious Liberty*.

Toleration, Actor. See *Act of Toleration*.

Tolima (tō-lē'mā), a state of the Republic of Colombia, intersected by the river Magdalena, and embraced between the two chief chains of the Cordillera; area, 18,000 sq. miles. It produces cacao, sugar, maize, and tobacco, and is rich in gold and silver. The volcano of Tolima has a height of 17,660 feet. Pop. 306,000. Capital, Ibagué.

Toll, a tax paid, or duty imposed, for some liberty or privilege or other reasonable consideration; such as (a) the payment claimed by the owners of a port for goods landed or shipped there; (b) the sum charged by the owners of a market or fair for goods brought to be sold there; (c) a fixed charge made by those intrusted with the maintenance of roads, streets, bridges, &c., for the passage of persons, goods, and cattle. See *Roads*.

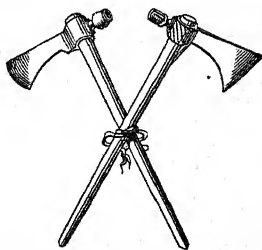
Tolstoi, COUNT LEO NIKOLAIEVITCH, celebrated Russian novelist, born in 1828. In 1851 he accompanied his brother to the Caucasus and entered the army, and during the Crimean war took part in the defence of Sebastopol. At the close of the war he retired to his estates and devoted himself to literary composition and schemes for the education and social improvement of the peasantry. Latterly he has entirely given himself up to working out the higher problems of life experimentally—working along with the peasantry in a sort of communistic life. Among his earliest writings of moment are his vivid sketches from Sebastopol. His three great novels are the *Cossacks*, *War and Peace*, and *Anna Karenina*. His later writings are all mostly directed towards an explanation of his peculiar social and mystic religious ideas. Among them are *Confessions*, *My Religion*, *The Search for Happiness*, *Two Generations*, *Infancy and Youth*, *Death*, *Great Problems of History*, *What is My Life?* *The Kreutzer Sonata*, &c.

Tolteks. See *Mexico*.

Tolu-balsam, a resin or balsam obtained from a tree of tropical South America, the *Myrospermum* (*Myracylon*) *toluiferum* or *peruiferum*. Tolu-balsam has a brownish-yellow colour, becomes quite hard and may be formed into a powder, has a pleasant aromatic flavour, and is used in certain medicinal preparations, though having little or no virtue of its own.

Tolu'ca, a city of Mexico, capital of the state of Mexico, 45 miles s.w. of the federal capital; situated 8500 feet above the sea. The city has a cathedral, a theatre, &c., and carries on the cotton manufacture and other industries. Pop. 25,940.

Tomahawk, the light battle-axe of the



Tomahawks of the North American Indians.

North American Indians. The head was originally of stone attached to the shaft by thongs, &c., but steel heads were latterly

supplied by American and European traders. The Indians could throw the tomahawk to a considerable distance, unerringly striking the object aimed at with the edge of the hatchet.

Toma'to, or LOVE-APPLE (*Lycopersicum esculentum*), a plant belonging to the natural order Solanaceæ. It is a native of South America, but has been introduced



Tomato (*Lycopersicum esculentum*).

into most other warm or temperate countries. It is cultivated for the sake of its fruit, which is fleshy, usually scarlet or orange, irregularly shaped, and is largely used in sauces, stews, and soups, as well as eaten by itself. The plant is a tender, herbaceous annual, with yellow flowers, and is cultivated to a considerable extent near London.

Tomb, any sepulchral structure, usually a chamber or vault formed wholly or partly in the earth, with walls and a roof, for the reception of the dead. See *Sarcophagus*, *Burial*, and *Funeral Rites*.

Tombac, **TOMBAK**, an alloy consisting of from about 75 to 85 parts copper, mixed with 25 to 15 parts zinc, and used as an imitation of gold for cheap jewelry. When arsenic is added it forms white tombac.

Tombig'bee, a river which rises in Tishomingo county, Mississippi, United States, and after an irregular course of 450 miles, joins the Alabama river 45 miles above Mobile; the united stream is called Mobile River below the junction. It is navigable for 410 miles from Mobile Bay.

Tomcod, an American name for certain small cod-fishes.

Tomello'so, a town of Spain in La Mancha, 50 miles E.N.E. of Ciudad Real. It has lately risen into importance as a centre of the wine trade, a great part of the claret and 'cognac' of commerce being here produced. Pop. 10,000.

Tomsk, a town of Western Siberia, capital of the government of Tomsk, on the

right bank of the Tom, on the great road to China. Manufactures include cloth, leather, and soap; and there is an extensive trade in furs, fish, and cattle, obtained in exchange for articles of European and Chinese manufacture. Pop. 63,533. —The government of Tomsk has an area of 329,040 square miles, and a pop. of 1,929,092. It is watered by the Obi and its tributaries, and is wild and desolate in the north, but furnishes excellent pasture in the south.

Ton, a denomination of weight equivalent to 20 hundredweights (contracted cwt.), or 2240 lbs. In America goods are sometimes weighed by the short ton, of 2000 lbs., the hundredweight being reckoned at 100 lbs.; but it is decided by act of congress that, unless otherwise specified, a ton weight is to be understood as 2240 lbs. avoirdupois.

Tone, in music, the sound produced by the vibration of a string or other sonorous body; a musical sound. Nearly every musical sound is composite, that is, consists of several simultaneous tones having different rates of vibration according to fixed laws, which depend on the nature of the sonorous body and the mode of producing its vibrations. The simultaneously sounding components are called *partial tones*; that one having the lowest rate of vibration and the loudest sound is termed the *prime*, *principal*, or *fundamental tone*; the other partial tones are called *harmonics* or *overtones*. See *Music*, *Gregorian Tones*, *Harmonics*, *Acoustics*.

Tone, **THEOBALD WOLFE**, born in Dublin, Ireland, 1763; educated at Trinity College; studied law in London, and was called to the bar at the Middle Temple (1789). He was an ardent sympathizer with the doctrines of the French revolution, and having promoted the combination of the Irish Catholics and Dissenters, he founded the society of United Irishmen in 1791. The discovery of his secret negotiations with France drove him to the United States (1795). He sailed for France in 1796, and became brigadier in Hoche's projected expedition to Ireland. He served in the Bavarian army in 1797, and in 1798 he was captured on board a French squadron bound for Ireland. He was brought to Dublin, and sentenced to death by a court-martial, but committed suicide in prison Nov. 19, 1798.

Tonga Islands. See *Friendly Islands*.

Tongata'boo, or **TONGA-TABU**, one of the most southern of the Friendly Islands, in the Pacific Ocean. It is of coral formation,

about 60 miles in circuit. Its soil is extremely fertile. See *Friendly Islands*.

Tongres (ton-gr; Flemish, *Tongerén*), a town of Belgium, in the province of Limburg, on the Geer, 12 miles south-west of Maestricht. Tongres has a church (Notre Dame) dating from 1240. Pop. 9152.

Tongue, the organ found in the mouth of most vertebrate animals, which exercises the sense of taste, and also assists in speech and in taking food. The name tongue is also given to very different structures in Invertebrata. In man the tongue is attached by its base or root to the hyoid bone; its other extremity being free. The upper surface is convex with a fibrous middle septum, called the *raphé*. The front two-thirds of the tongue are rough, and bear the *papillæ*, in which the sense of taste resides. The posterior third is smooth, and exhibits the openings of numerous mucous glands. The substance of the tongue consists of numerous muscles. The *papillæ*, which cause the characteristic roughness of the tongue, are of three kinds, *circumvallate*, *fungiform*, and *filiform*. The largest or *circumvallate* *papillæ* number from eight to ten, and occupy the posterior part of the upper surface. They vary from $\frac{1}{10}$ th to $\frac{1}{8}$ th inch in diameter. The *fungiform* *papillæ* are scattered irregularly, the *filiform* over the front. In structure the *papillæ* are like those of the skin (which see), and contain capillary vessels and nervous filaments. Numerous *follicles* and *mucous* or *lingual* glands exist on the tongue, the functions of these latter being the secretion of mucus. The nervous supply is distributed in the form of three main nerves to each half of the organ. The *gustatory* nerves and the *glossopharyngeal* branches are the nerves providing the tongue with common sensation, and also with the sense of taste; while the *hypoglossal* nerve invests the muscles of the tongue with the necessary stimulus. The conditions necessary for the exercise of the sense of taste are, firstly, the solution of the matters to be tasted; secondly, the presence of a special gustatory nerve; and thirdly, that the surface of the tongue itself be moist. The top and edges of the tongue are more sensitive to taste than the middle portion. The sense of touch is very acute in the tongue.

Tonic, or KEY-NOTE, in music, the first or fundamental note of any scale, the principal sound on which all regular melodies depend, and in which they or their accompanying basses naturally terminate,

Tonic, in medicine, any remedy which improves the tone or vigour of the fibres of the stomach and bowels, or of the muscular fibres generally. Tonics may be said to be of two kinds, medical and non-medical. Medical tonics act chiefly in two ways: (1) indirectly, by first influencing the stomach and increasing its digestive powers; such being the effect of the vegetable bitters, the most important of which are calumba, chamomile, cinchona bark, gentian, taraxacum, &c. (2) Directly, by passing into and exerting their influence through the blood; such being the case with the various preparations of iron, certain mineral acids, and salts. The non-medical tonics are open-air exercise, friction, cold in its various forms and applications, as the shower-bath, sea-bathing, &c.

Tonic Sol-fa System, in music, a system of notation and teaching which has recently been widely spread among the English-speaking population of the globe, chiefly through the untiring efforts of the Rev. John Curwen of Plaistow, who obtained the leading features of his plan from Miss Glover of Norwich. The following is an outline of the system: As of the two relations of musical sounds, those of pitch and key (see *Music*), the latter is of transcendent importance, every means should be taken to impress this fact on the mind and ear of the learner. Any diatonic scale is a natural scale, whether it is founded on the key of C, D, E, or on any other tone thus represented by a letter-name in the ordinary notation. The tonic or key-note of the scale is always called *doh*, the second *ray*, the others *me*, *fah*, *soh*, *lah*, *te*, successively, no matter what the absolute pitch of the sound may be, the initials only being ordinarily used in printed music: thus, *d*, *r*, *m*, *f*, *s*, *l*, *t*. To designate a sound of absolute pitch, the tonic-solfist uses the first seven letters of the alphabet just as the followers of the other musical system do. Time and accent are marked thus, | : |, or | : : |, or | : : : |, &c.; the space between the lines and dots indicating the aliquot parts of the bar (the beat or pulse), the line showing the strong accent, the short line the medium accent, and the colon the weak accent. Accidental or chromatic tones are indicated by a change in the vowel sounds of the syllables; thus, *doh*, *ray*, *fah*, &c., when sharpened become *de*, *re*, *fe*, &c.; and *me*, *te*, &c., flattened become *ma*, *ta*, &c. The higher octaves are marked *d'*, *r'*, *m'*, &c., the lower *d*, *r*, *m*, &c. The last

TONKA BEAN—TONSURE.

two lines of the psalm tune *French* would therefore be printed thus:—

Key F.

:s|d:t|l:s|s:fe|s:m|r:d|d:t|d

In teaching the system great use is made of the *modulator*, a chart which represents pictorially in an upright position the relative places of the notes of the scales, the chromatic notes, the closely related scales, &c.

Tonka (or TONGA) Bean, the fruit of the *Dipterix odorata* or *Coumarouna odorata*, a shrubby plant of Guiana, nat. order Leguminosæ, sub-order Papilionaceæ. The fruit



Tonka-bean Plant (*Dipterix odorata*).

is an oblong dry fibrous drupe, containing a single seed. The odour of the kernel is extremely agreeable. It is used in perfumery. Called also *Tonkin-bean*, *Tonquin-bean*. See *Coumarin*.

Tonnage, a word originally signifying the number of tons weight which a ship might carry with safety, but now used to denote the gauge of the vessel's dimensions, and the standard for tolls, dues, &c. It is generally assumed that 40 cubic feet shall constitute a ton, and the tonnage of a ship is considered to be the multiple of this ton which most closely corresponds with the internal capacity of the vessel. Formerly the rule was to multiply the length of the ship by the breadth, assume the depth to be the same as the width, multiply by this assumed depth, and divide the product by 94, the quotient being the tons burden. But this mode was found to be both misleading and dangerous; for as harbour and light dues, towage, &c., were charged according to tonnage, shipowners had their ves-

sels built so deep and narrow that they were often unseaworthy. An improved system was introduced in 1835, and made compulsory and developed by acts of 1854 and 1894. The instructions in these statutes take into account not only the depth of the vessel, but also make allowance for the varying curvature of the hull. The depth from the deck to the bottom of the hold is taken at different places, and the breadth is measured at different elevations in the depth. If the vessel is a steamer an allowance is made for the space occupied by the engine-room, boilers, coal-bunks, &c. In vessels with a break or poop in the upper deck, the tonnage of this poop space must be ascertained and added to the ordinary tonnage. In the United States the measurement is similar.

Tonnage and Poundage were duties formerly imposed in England on exports and imports. Tonnage was a duty upon all wines imported. Poundage was an *ad valorem* duty of 12*d.* in the pound on all merchandise imported or exported. They were first levied by agreement, and were granted by parliament to the crown for a limited period in 1370. They were afterwards granted to successive sovereigns until 1787, when they were finally abolished by 27 Geo. III. c. 13.

Tonquin (tong-king'), a French possession in Asia, on the south-west of China, extending inland from the sea to Burmah; area, 46,000 sq. miles. The chief river is the Song-ka. It produces rice, cotton, spices, and sugar; and is rich in timber and minerals. The climate is unhealthy. In 1884 Tonquin was ceded to France. Capital, Hanoi. Pop. 7,000,000.

Tønsberg (tunz'berh'), the oldest town in Norway, on a fjord branching off from Christiania Fjord. (See *Christiania*.) Many vessels belong to it. Pop. 8620.

Tonsillitis. See *Quinsy*.

Tonsils, in anatomy, two oblong suboval bodies situated on each side of the throat or fauces. Their minute structure resembles that of the closed sacs or follicles of Peyer in the intestine, and their function is not yet understood. See *Palate*.

Tonsure, the name given to the bare place on the heads of the Roman Catholic and Greek priests, formed by shaving or cutting away the hair and keeping it so. The custom of cutting away the hair in token of the dedication of a person to the service of God is mentioned as early as the 4th century. Shaving the hair precedes

consecration: it is performed by the bishop. The tonsure admits the subject into holy orders, and the extent of the tonsure increases with the rank held.

Tontine, a kind of life annuity, so called from their inventor Tonti, an Italian of the 17th century. A tontine is an annuity shared by subscribers to a loan, with the benefit of survivorship, the annuity being increased as the subscribers die, until at last the whole goes to the last survivor, or to the last two or three, according to the terms on which the money is advanced. By means of tontines many government loans were formerly raised in England.

Tooke, JOHN HORNE, son of John Horne, a rich poulterer, was born in Westminster in 1736. He was educated at Westminster and Eton, afterwards proceeding to St. John's College, Cambridge. In 1760 he entered the church, and obtained the living of New Brentford. A close friendship with Wilkes ended in a public altercation in 1770 and 1771. The year 1771 also witnessed his contest with Junius, in which, in the general opinion, he came off victor. In 1773 he resigned his benefice to study for the bar (to which from being in orders he was not admitted); and by his legal advice to Mr. Tooke of Purley, he became that gentleman's heir, and assumed his name. In 1777 he was prosecuted for a seditious libel condemning the American war, and his trial resulted in a year's imprisonment, and a fine of £200. He was a short time member of parliament for Old Sarum. He died in 1812. He wrote several political pamphlets and an ingenious linguistic work entitled *Epea Pteroenta*, or the *Diversions of Purley*.

Toole, JOHN LAWRENCE, a comedian, born in London 1833, and educated at the City of London School. After serving for some time as a clerk he took to the stage, and made his first appearance at the Haymarket in 1852. In 1880 he commenced the management of the Folly Theatre, London, which he afterwards reconstructed and named after himself. In 1874 he visited America, in 1888 he published his *Reminiscences*, and in 1890 made a successful tour in the *Antipodes*. He died in 1906. He was exceedingly popular, and was inimitable in his personation of semi-pathetic, semi-ludicrous characters. Among his most successful impersonations were Paul Pry, Caleb Plummer in the *Cricket on the Hearth*, Uncle Dick in *Uncle Dick's Darling*, &c.

Toon, **TOONA**, the wood of an East Indian

tree, the *Cedrela Toona*, nat. order *Cedrelaceæ*. It is sometimes called *Indian mahogany*, and also *Indian cedar*. Another species (*C. australis*) yields the so-called cedar-wood of New South Wales. Toonwood is highly valued as a furniture wood, and is used for door-panels, carving, &c. See *Cedrela*.

Tooth. See *Teeth*.

Toothache, a well-known affection of the teeth, arising from various causes. Inflammation of the fangs of the teeth is a common cause. If the inflammation is not reduced matter forms, and the result is a gum-boil. Caries is a frequent cause of toothache, the outer part of the tooth rotting away and exposing the nerve. Neuralgic toothache is a purely nervous variety, and may occur either in sound or carious teeth. As a preventive against toothache the teeth should be kept scrupulously clean, and when they show symptoms of decay the services of a skilful dentist should be had recourse to. The decay of a tooth is very often arrested by stopping or filling up the cavity.

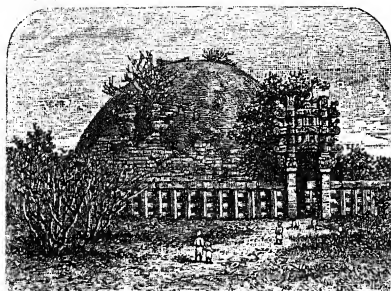
Tooth-shell. See *Dentalium*.

Toothwort. See *Dentaria*.

Toowoomba, the principal town of the Darling Downs district of Queensland, Australia, 100 miles west of Brisbane. It occupies one of the best localities in S. Queensland, in the centre of a large agricultural settlement; contains a number of religious, educational, and other public buildings, and many handsome private residences. Wine is produced in the vicinity. Pop. 9187.

Topaz, a mineral, ranked by mineralogists among gems, characterized by having the lustre vitreous, transparent to translucent; the colour yellow, white, green, blue; fracture subconchoidal, uneven; specific gravity, 3.499. It is harder than quartz. It is a silicate of aluminium, in which the oxygen is partly replaced by fluorine. It occurs massive and in crystals. The primary form of its crystal is a right rhombic prism. Topazes occur generally in igneous and metamorphic rocks, and in many parts of the world, as Cornwall, Scotland, Saxony, Siberia, Brazil, &c. The finest varieties are obtained from Brazil and the Ural Mountains. Those from Brazil have deep yellow tints; those from Siberia have a bluish tinge; the Saxon topazes are of a pale wine-yellow, and those found in the Scotch Highlands are of a sky-blue colour. The purest from Brazil, when cut in facets, closely resemble the diamond in lustre and brilliance.

Tope, a popular name for a species of Buddhist monument intended usually to mark some important event. The oldest monuments of this kind are spherical or



Great Tope at Sanchi, Central India.

elliptical cupolas, resting on a circular or rectilinear base, with an umbrella-shaped structure on the apex. See *Dagoba*.

Tope (*Galeus canis*), a European fish of the shark family, 6 feet long.

Tope'ka, a city of the United States, capital of state of Kansas, on the Kansas River. It has wide well-built streets, and contains a handsome state-house, court-house, several high-class educational institutions, &c. There are flour-mills, iron-foundries, a rolling-mill, machine-shops, brick-kilns, breweries, &c. Coal is found in the neighbourhood. Pop. 33,608.

Top-Haneh. See *Constantinople*.

Tophet. See *Gehenna*.

Toplitz. See *Teplitz*.

Torgau, a town of Prussia, prov. Saxony, 45 miles E.N.E. of Merseburg, on the Elbe, a fortress till 1891. Pop. 12,000.

Tormentil (*Potentilla Tormentilla*), a trailing plant common in Britain in heathy or waste places. See *Potentilla*.

Torna'do, a violent cyclonic storm; more especially applied to those whirlwind hurricanes prevalent in the West Indies, and on the west coast of Africa about the time of the equinoxes, and in the Indian Ocean about the changes of the monsoons. Tornadoes are usually accompanied with thunder, lightning, and torrents of rain; but are of short duration and limited in area.

Torneå (tor'ne-å), a town in North Finland, Russia, at the mouth of the River Torneå, which forms part of the Russo-Swedish boundary; a place of good trade, opposite Haparanda, in Sweden. Pop. 1500.

Toron'to, the second city of the Dominion of Canada, and capital of the province of Ontario, is situated on a small bay on the north shore of Lake Ontario, towards its western end, 315 miles w.s.w. of Montreal, and stretches along the lake front for 8 miles. It is regularly built, the streets are wide, well paved, and in general of handsome architecture; and the public buildings are numerous, and many of them very handsome. The churches most worthy of notice are St. James's and St. Alban's cathedrals (Anglican), St. Michael's (Catholic), the Metropolitan Church (Methodist), and St. Andrew's Church (Presbyterian), the last with one of the finest organs in America. The secular buildings include the University of Toronto, situated in beautiful grounds, the main building, in the Norman style with a

massive tower, being rebuilt after the great fire of 1890; the lieutenant-governor's residence; the buildings of the provincial legislature; Osgoode Hall, the seat of the provincial law courts; the city hall and court-house; the normal school; Trinity College; custom-house; post-office; school of practical science; buildings for the annual exhibitions; the lunatic asylum; besides handsome banks, hotels, &c. Queen's Park, adjoining the University, is one of the many public parks (total area, 1700 acres). Toronto University is one of the best equipped in America. Other educational institutions, some of them affiliated to the University, are Trinity College or University and Wycliffe College (both Anglican); Knox College (Presbyterian); M'Master University (Baptist); Victoria University (Methodist); St. Michael's College (Catholic); together with the provincial normal and model schools, schools of medicine, &c. Toronto receives electric power from Niagara Falls, and its industries embrace engines and machinery, cars and carriages, furniture, ironmongery, agricultural implements, brewing, tanning, soap, boots and shoes, pianos and organs, stoves, &c. It is a great centre of traffic both by lake steamer and railway, and also centre of banking and insurance. It is served by the Grand Trunk, Canadian Pacific, and Canadian Northern. It was founded in 1794 and was first named York. Pop. in 1881, 86,415; in 1891, 181,215; in 1901, 208,040; in 1908, 287,201; with suburbs, 338,800.

TORPEDO — TORQUAY.

Torpe'do, the name of fishes allied to the rays, and noted for their power of giving electrical shocks. The electrical organs consist of two masses placed on each side of the head, composed of numerous gelatinous columns separated by membranous septa, and richly furnished with nervous filaments. Their production of electricity is explicable on the ground of the conversion of nerve force into electric force by the electric organs; just as nerve force is converted into motion through the muscles. The torpedoes occur chiefly in the Mediterranean, and in the Indian and Pacific Oceans. A large specimen may measure 4 feet long, and weigh from 60 to 70 lbs.

Torpedo, an explosive engine used in naval warfare against an enemy's vessels. A form of torpedo was employed in the American Civil war, but the torpedo of all navies is now the automobile Whitehead torpedo, invented about 1864, and steadily improved since. It is cigar-shaped, made of steel or phosphor bronze, 18 to 20 feet or more in length, and 14 or 18 inches in greatest diameter. The explosive head contains a charge of over 100 lbs. of wet gun-cotton, ready to be exploded when by impact with a vessel the pointed striker is driven in against the detonating charge of fulminate of mercury. Behind the explosive head there is the air-chamber, containing compressed air for driving the torpedo engine. Farther aft there is the 'balance chamber', containing an apparatus for keeping the torpedo at a fairly uniform depth, through the action of a swinging weight made to work horizontal rudders at the tail. In the 'buoyancy chamber' there is an ingenious steering apparatus for causing the torpedo to keep in a straight line for a great distance, depending on the principle of the gyroscope. The aftmost part of the torpedo is the tail, with vertical and horizontal rudders, and two screw propellers operated by the air-engine. Torpedoes are discharged from *torpedo-tubes*, which are fitted to most war-vessels, but especially to the vessels known as *torpedo-boats*. In battleships these tubes are submerged, and there are special appliances for discharging the torpedo, which may be done simply by pressing a key in the conning tower. Nets hung out on long spars around the ship are used as a protection against torpedo attack. The effectiveness of the torpedo was clearly established by the Japanese before Port Arthur. Its range extends to about 2000

293

yards. In the British service there is also the Brennan torpedo, controlled and directed by wires, and chiefly intended for harbour and coast protection. *Submarine mines* are a kind of stationary torpedoes, intended for the defence of harbours, &c. They contain a charge of gun-cotton or other explosive, and act when, by contact with a vessel's side, an electrical circuit is completed with a battery on shore, which fires the charge in the mine.

Torpedo-boat, a vessel whose chief function is to sink the vessels of an enemy by discharging torpedoes at them. Their special feature accordingly consists of torpedo-tubes, but all torpedo-boats carry some quick-firing guns in addition, these being especially intended for use in action with other torpedo-boats. They are vessels of low freeboard, designed for considerable speed, and manned by a small crew. Some torpedo-boats are intended only for coast defence, others are sea-going vessels, and accompany battleships and cruisers to protect these against the enemy's torpedo-boat attacks. They usually make their attacks under cover of darkness, and their work is of a very dangerous kind. The tubes of torpedo-boats are carried on deck, and not submerged like those of battleships and cruisers. The torpedo-boat was introduced about 1877. It has been more favoured in some foreign countries than in Britain, and especially in France.

Torpedo-boat Destroyer, or simply *Destroyer*, a vessel of high speed designed to sink the torpedo-boats of an enemy by means of quick-firing guns. The destroyer was introduced in the British navy in 1893, and Britain has now a large fleet of destroyers. Destroyers carry torpedo-tubes, and can be used as torpedo-boats. The present British type of destroyer has a length of about 230 feet and a displacement of 500 tons. It carries six quick-firing guns, mostly 6-pounders, and two torpedo-tubes, not submerged. Its speed is about 30 knots. Large destroyers are being built. Like the torpedo-boat, the destroyer is now often fitted with turbine engines.

Torpedo-net, a net of steel which is hung round battleships and cruisers at anchor to protect them against torpedoes.

Torquay (tor-ké'), a mun. bor., seaport and watering-place of England, on the south coast of Devonshire (giving name to a parl. div.), on Torbay. It is well built, and consists principally of two streets, one of

TORQUE—TORTOISE

them about 1 mile long, of several commanding terraces, and of a great number of isolated cottages and villas, with gardens attached. It has several handsome churches, a town-hall, assembly-rooms, &c., and a long pier forming an excellent promenade. The water supply and drainage system are excellent. For invalids its climate in winter is among the best in England. Pop. 33,625.

Torque (tork), or **Torc**, a personal ornament worn by certain ancient nations, as by the ancient Britons, Gauls, and Germans. It was a sort of collar, formed of gold wires twisted together, or sometimes of a thin metal plate, generally of gold, and was worn round the neck.

Torquemada. See *Inquisition*.

Torre Annunziata, a seaport of Italy, at the foot of Mount Vesuvius, from the eruptions of which it has at various times suffered, on the Bay of Naples, with a small harbour. Pop. 25,000.

Torre del Greco, a seaport and health-resort of Italy, on the Bay of Naples, at the foot of Mount Vesuvius. The town has suffered much by eruptions of Vesuvius. Pop. 28,000.

Torrens, LAKE, a large shallow salt lake of South Australia, about 90 miles N. of Spencer's Gulf. In the dry season it is merely a salt marsh.

Torres Strait, the strait which separates Australia from New Guinea, being about 80 miles across. It is crowded with islands, shoals, and reefs, rendering its navigation difficult.

Torres Vedras, LINES OF, so called from a village in Portugal 24 miles north-west of Lisbon. These stupendous works, constructed by Wellington in 1810, consisted of two fortified lines, the one 29 miles in length, the other, in the rear of the former, 24 miles in length, forming an impregnable barrier between the French troops and Lisbon. The lines of Torres Vedras saved Lisbon, baffled a well-appointed French army, and gave Wellington a fair opportunity to enter upon offensive operations. See *Spain*.

Torricelli (tor-ri-chel'le), **EVANGELISTA**, Italian physicist, born in 1608, died in 1647. Torricelli's name is important in the history of science as the discoverer of the law on which the barometer depends. See *Barometer*.

Torrington, a municipal borough of England, in the county of Devon, on the Torridge, 32 miles north-west of Exeter. Glove-making is the principal industry. Pop. 3445.

Torshok, an old cathedral town of Russia, government of Tver. Pop. 14,574.

Torsion Balance, an instrument employed to measure the intensities of very small forces. It consists of a fine wire, silk thread, or the like, suspended from a fixed point, and having a horizontal needle attached, the force being measured by the resistance to twisting which the filament exhibits when the force (that of attraction, for instance) acts on the needle.

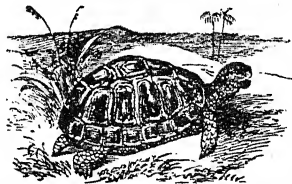
Torsk (*Brosomus vulgaris*), a fish of the cod tribe found in great quantities off the Orkney and Shetland Islands, where it constitutes a considerable article of trade. It is, when salted and dried, a savoury stock-fish. It is from 18 to 30 inches long, and is called also *tusk*.

Torso (Italian), an art term signifying the trunk of a statue of which the head and the extremities are wanting. The *torso* of Hercules, in the Belvedere at Rome, is considered by connoisseurs one of the finest works of art remaining from antiquity.

Torstenson, LINNARD, a Swedish general, born 1603, died 1651, distinguished in the Thirty Years' war (which see), being appointed leader of the Swedish army in Germany in 1641, and having commanded it for five years.

Tort, in law, denotes injustice or injury. Actions upon torts or wrongs are all personal actions for trespasses, nuisances, assaults, defamatory words, and the like.

Tortoise (tor'tis), the name applied to various genera of reptiles included in the order Chelonian, along with the turtles and

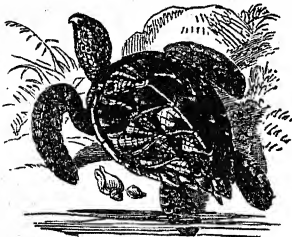


Common or Greek Tortoise (*Testudo graeca*).

their allies. The distinctive features of the tortoises and other Chelonians consist in the modification of the skeleton and of the skin-structure or scales to form the well-known bony box in which their bodies are inclosed, the upper portion of which is the *carapace*, the lower the *plastron*. The Testudinidae or typical land-tortoises have short stunted limbs adapted for terrestrial progression; the short toes are bound together by the skin,

TORTOISE-SHELL — TORTURE.

and have well-developed nails. The carapace is strongly convex, and is covered by horny epidermic plates. The horny jaws are adapted for cutting, or may be divided into serrated processes. The head, limbs, and tail can be completely retracted within the carapace. Though capable of swimming, the tortoises proper are really terrestrial animals, and are strictly vegetable feeders. The most familiar example is the common Greek or European tortoise (*Testudo græca*) so frequently kept as a household pet, and which occurs chiefly on the eastern borders of the Mediterranean. These animals sometimes live to a great age (over 100 years according to some), and hibernate through the colder season of the year. They attain a length of 12 inches. A much larger species is the great Indian tortoise (*T. indica*), which attains a length of over 3 feet and a weight of 200 lbs. Its flesh is reckoned food of excellent quality, as are also its eggs. The box tortoise of India and Madagascar (*Cinyxia arachnoides*) is remarkable for the curious development of the front part of the plastron, which shuts over the anterior aperture of the shell like a lid when the animal retracts itself. In the box tortoise of North America (*Cistudo carolina*) the hinder part of the plastron forms a lid. It is included among the Emydæ or terrapins. (See *Terrapin*.) Other genera include the alligator terrapin (*Chelydra serpentina*) of America, also called the 'snapping turtle.' (See *Snapping Turtle*.) The mud or soft tortoises (*Trionychidæ*) occur in Asia, Africa, and North America. They have soft fleshy lips, and no horny plates are developed in the skin. Very frequently also the ribs are not so modified as to form a hard carapace, as in other chelonians. See also *Turtle*.



Hawk's-bill or Tortoise-shell Turtle (*Chelonia imbricata*).

Tortoise-shell, a name popularly applied to the shell or rather the scutes or scales of the tortoise and other allied chelonians,

especially to those of the *Chelonia imbricata* (the hawk's-bill turtle), a species which inhabits tropical seas. The horny scales or plates which form the covering of this animal are extensively used in the manufacture of combs, snuff-boxes, &c., and in inlaying and other ornamental work. It becomes very plastic when heated, and when cold retains with sharpness any form it may be moulded to in its heated state. Pieces can also be welded together under the pressure of hot irons. It is now largely imitated by horn and cheap artificial compounds.

Tortoise-shell Butterfly, a name given to two British butterflies, the small tortoise-shell (*Vanessa urticae*) and the large tortoise-shell (*V. polychlōros*), from the colouring of the wings.

Torto'la, a British West Indian island, chief of the Virgin Islands; area, 26 sq. miles. It is bare and rugged, rising to a height of 1600 feet. It contains Roadtown, the capital of the group. Total pop. 3500.

Torto'na, a town in Northern Italy, 12 miles east of Alessandria, in the province of Alessandria. The principal edifice is the cathedral (1575). Pop. 8000.

Torto'sa, a fortified city of Spain, in Catalonia, 48 miles south-west of Tarragona, on the Ebro. There is a cathedral dating from 1347, but the other buildings are unimportant. An active trade is carried on. Pop. 13,000.

Tortu'gas, or **DRY TORTUGAS**, a group of ten small low barren islands belonging to Florida, United States, about 40 miles w. of the most western of the Florida Keys. On Loggerhead Key there is a lighthouse 150 feet high.

Torture, the arbitrary and especially excessive infliction of pain judicially, whether to extort confession or to aggravate punishment. Torture has been common in all the nations of modern Europe, and it was also practised by the ancient Romans. The practice was first adopted by the church in the early middle ages, and when the old superstitious means of discovering guilt (as in ordeal by fire and water) lost their efficacy torture became general in Europe. Though never recognized by the common law of England, it was employed there as late as the reign of Charles I., and in Scotland torture was not wholly abandoned till very near the close of the 17th century. Every reader is familiar with the horrid tortures inflicted on those accused of witchcraft, and on many of the Covenanters, by means

of thumbkins, the boot, &c., in order to discover alleged hiding-places and the like. In the German states torture continued to be practised under certain restrictions till the close of the last century. The chief instrument of torture was the *rack* (which see).

Tory, a political party name of Irish origin, first used in England about 1679, applied originally to Irish R. Catholic outlaws, and then generally to those who refused to concur in the scheme to exclude James II. from the throne. The nickname, like its contemporaneous opposite *Whig*, in coming into popular use became much less strict in its application, until at last it came simply to signify an adherent of that political party in the state who disapproved of change in the ancient constitution, and who supported the claims and authority of the king, church, and aristocracy, while their opponents, the Whigs, were in favour of more or less radical changes, and supported the claims of the democracy. In modern times the term has to some extent been supplanted by *Conservative*.

Tota'ra (*Podocarpus totara*), a timber-tree of New Zealand, allied to the yew.

Totem, a rude picture of some natural object, as of a bird or beast, used by the American Indians as a symbol and designation of a family or tribe. A similar practice has been found to prevail among other savage peoples, and some theorists have given it a very wide extension on purely conjectural grounds.

Totnes, a town of England, co. Devon, 24 miles s.s.w. of Exeter, on the Dart, giving name to a parl. div. Pop. 4034.

Toucan (*Rhamphastos*), a genus of scan-

regions of South America, and are distinguished by a large keeled bill. The bill is about 8 inches long, and its substance is hollowed out into air-cells, thus being comparatively light. The toucans feed on fruits, seeds, insects, &c. The prevailing colours among the toucans are yellow, black, and red. The bill is frequently very brilliantly coloured.

Touch, the sense of feeling and the most widely diffused of the senses. It resides in the skin (see *Skin*), and is exercised through certain structures situated in the papillæ of the true skin and connected with terminal filaments of sensory nerves. These structures have some variety of form, and are called tactile cells, tactile corpuscles, compound tactile corpuscles, Pacinian corpuscles, &c. All the kinds are to be regarded as terminal organs of the sensory nerves, acting as the media by which impressions made on the skin are communicated to the nerve fibres. Although the sense of touch is diffused over the whole body, it is much more exquisite in some parts than in others. Experiment shows the tip of the tongue to be the most sensitive surface, the points of the fingers come next, while the red part of the lips follows in order. The neck, middle of the back, and the middle of the arm and thigh are the least acute surfaces.

Touch-me-not. See *Impatiens*.

Touch-needles. See *Touchstone*.

Touch-paper, paper steeped in saltpetre, which burns slowly, and is used as a match for firing gunpowder, &c.

Touchstone, a variety of extremely compact siliceous schist, used for ascertaining the purity of gold and silver. Known also as *black jasper* and *basanite*. It was called *Lydian stone*, or *lapis Lydia*, by the ancients, because found in Lydia in Asia Minor. A series of needles (called *touch-needles*) of which the composition is known are used for comparison with the article to be tested. When the colour of the streak produced by both the needle and the trinket on the stone is the same the quantity of alloy they contain is supposed to be similar.

Touchwood, a soft white substance into which wood is converted by the action of such fungi as *Polyporus igniarius*. It is easily ignited, and continues to burn for a long time like tinder.

Toul (töl), a town of France, department of Meurthe-et-Moselle, on the Moselle, 12 miles west of Nancy. It is strongly fortified, and has a fine Gothic cathedral, completed



Red-billed Toucan (*Rhamphastos erythrorhynchus*).

social or climbing birds of the family Rhamphastidae. These birds inhabit the tropical

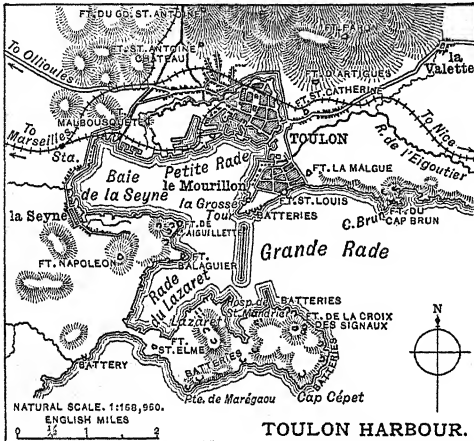
TOULA — TOURAINE.

in the 15th century. Toul was taken in the Franco-German war after a siege of five weeks, 23d September, 1870. Pop. 7610.

Toula. See *Tula*.

Toulon-sur-Mer (tō-lōn-sūr-mär), a seaport, and after Brest the most important

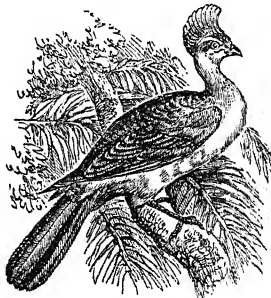
Sernin, the Hotel de Ville, and the Palais de Justice. Toulouse has university faculties, a Roman Catholic university, a lyceum, and other educational institutions, public library of 60,000 vols., &c. It is the chief entrepôt of the district for agricultural produce and general trade, and is an important industrial centre. It is a place of great antiquity, and rose to eminence under the Romans, who embellished it with a capitol, amphitheatre, and other edifices, of which vestiges still remain. It was the capital of the kingdom of the Visigoths from 419 till 508, when Clovis gained possession of it. Subsequently it became the capital of Aquitaine, was long governed by independent counts, and in the 13th century fell a prey to the cruel bigots of the Inquisition (see *Albigenses*), and then was joined to the French crown. The French were defeated by the British under its walls in 1814. Pop. 149,791.



naval station of France, in the department of the Var, situated on a bay of the Mediterranean, 42 miles E.S.E. of Marseilles. It is defended by numerous forts and redoubts, and strong forts and outworks occupy all the heights surrounding the town. Toulon has a cathedral originally Romanesque of the 11th century, a good town-hall, theatre, &c., besides the arsenal and other marine establishments, which are on a most extensive scale. The chief harbours and docks are separated from the roadstead by moles, which are hollow and bomb-proof, and lined by batteries, and the storehouses, ship-yards, workshops, &c., are most complete. The trade is not important. Toulon suffered severely at the hands of the republicans in 1793 after the withdrawal of the British, whom the inhabitants had voluntarily admitted, and who destroyed here the French republican fleet. Pop. 101,172.

Toulouse (tō-lōz), a town of Southern France, capital of the department of Haute-Garonne, on the Garonne (which is navigable and crossed by three bridges), 160 miles S.E. of Bordeaux. The streets are narrow and irregular, and the houses generally unpretentious. Among remarkable public buildings are the cathedral, the church of St.

Touraco, a name of insectorial birds of the genus *Corythaix* or *Turacus*, natives of Africa, and allied to the Scansores, or climbing birds. Their prevailing colour is green, varied in some species with purple on the wings and tail. They



Touraco (*Corythaix erythrolophus*).

feed chiefly on soft fruits. For a different bird called Touraco, see *Hoatzin*.

Touraine (tō-rän), an ancient province of France, bounded north by Maine, east by Orléanais and Berry, south by Berry and Poitou, and west by Anjou and Poitou. It now forms the department of Indre et Loire.

Tourcoing (tör-kwan), a town of France, department of Nord, 9 miles N.N.E. of Lille, a well-built thriving manufacturing town, the staple manufactures being woollen, cotton, linen, and silk stuffs, besides dye-works, soap-works, sugar-refineries, machine works, &c. Pop. 78,463.

Tourguenieff (tör-gen'yef), IVAN SERGEYEVITCH, a celebrated Russian novelist, born at Orel 1818, died near Paris 1883. He belonged to a noble and ancient family, and was educated at Moscow, St. Petersburg, and Berlin. In 1842 he obtained an appointment in the ministry of the interior; but having written an article displeasing to the authorities, he was shortly afterwards banished to his paternal estate. For some years he led the life of a country gentleman, gaining an intimate acquaintance with Russian peasant life. His first important publication was translated into English under the title of *Russian Life in the Interior*, or the *Experiences of a Sportsman*. It was followed by a great number of short tales and dramas, contributed chiefly to Russian periodicals. Among his earliest novels were *A Nest of Nobles* (or *Liza*; 1859), and *On the Eve* (1860). A powerful politico-social novel, *Fathers and Sons*, was published in 1862, and met with much adverse criticism in Russia. His other works include *Smoke*, *Spring Floods*, *Virgin Soil*, &c., all of which have been translated into English. Tourguenieff has been ranked with the greatest masters of fiction.

Tourmaline (tör'ma-lin), a mineral occurring crystallized in three-sided or six-sided prisms, terminated by three-sided pyramids, the primary form being a rhomboid. It scratches glass easily, has a specific gravity of 3, and consists principally of a compound silicate and borate of alumina and magnesia. Tourmaline occurs most commonly in igneous and metamorphic rocks, especially in granite, gneiss, and mica-slate. Some varieties are transparent, some translucent, some opaque. Some are colourless, and others green, brown, red, blue, and black. Red tourmaline is known as *rubellite*, blue tourmaline as *indicolite*, and black tourmaline as *schorl*. The transparent varieties include various well-known jewelry stones, as the Brazilian sapphire, the Brazilian emerald, &c. Prisms of tourmaline are much used in polarizing apparatus, and it possesses powerful electric properties.

Tournai (tör-nä; in Flemish, *Doornik*, *dör'nik*), a town of Belgium, in the province

of Hainaut, on both sides of the Scheldt, which is here crossed by seven bridges and lined by fine quays. The streets are for the most part spacious, with well-built houses. Among the principal edifices are the cathedral, an ancient structure in the Romanesque style; the church of St. Brice (12th century); and the old monastery of St. Martin, now used as a town-house. The leading manufactures are linens, woollens, cottons, and Brussels carpets. Tournai is one of the oldest towns of Belgium, and was anciently the chief town of the Nervii, and afterwards the residence of some of the early Frankish kings. Pop. 36,744.

Tournament, or **TOURNEY**, a common sport of the middle ages, in which parties of mounted knights encountered each other with lances and swords in order to display their skill in arms. Tournaments reached their full perfection in France in the 9th and 10th centuries, where they first received the form under which they are known to us. They were introduced into England soon after the Conquest by the Normans. *Jousts* were single combats between two knights, and at a tournament there would often be a number of jousts as well as combats between parties of knights. The place of combat was the *lists*, a large open place surrounded by ropes or a railing. Galleries were erected for the spectators, among whom were seated the ladies, the supreme judges of tournaments. A knight taking part in a tournament generally carried some device emblematic of a lady's favour. Tournaments gradually went out with the decline of chivalry, and were little practised after the 16th century.

Tournefort (törn-för), JOSEPH PITTON DE, a French botanist, born in 1656. He was educated by the Jesuits, and in 1683 became professor of botany at the Jardin des Plantes, Paris. He visited Greece and Asia Minor, and wrote *Voyage au Levant*. His chief work is entitled *Institutiones Rei Herbariæ* (three vols., Paris, 1700). He died in 1708, being then professor of medicine in the Collège de France.

Tourneur, CYRIL, an English tragic poet, of whose existence we have little certain information beyond the respective dates of his first and last extant works (1600-13). The two plays on which his fame rests are *The Atheist's Tragedy* (1607) and *The Revenger's Tragedy* (1611). The force of his genius places him in the front rank of English dramatic poets.

TOURNIQUET — TOWN-CLERK.

Tourniquet, an appliance employed in the practice of surgery to stop bleeding, its use being only intended to be temporary. Some kind of ligature twisted tight with a stick forms a simple tourniquet.

Tours (tör), a town of France, capital of the department of Indre-et-Loire, on the left bank of the Loire, 145 miles by rail south-west of Paris. The Loire is here crossed by two suspension bridges, a railway bridge, and a fine stone bridge 1423 feet long. Many of the streets are spacious and elegant, and there are several historic chateaux in the neighbourhood. The principal edifice is the cathedral (Tours being an archbishopric), flanked by two towers, 205 feet high, a fine building begun in the 12th, completed in the 16th century. Of the old abbey church of St. Martin of Tours only two towers remain. The modern buildings include the church of St. Joseph, the theatre, and the museum. Manufactures include silk, cloth, carpets, chemicals, &c., and there is a large printing and publishing establishment. Tours was known to the Romans by the name of *Cæsarodunum*. In later times it became famous for its silk manufactures, and had a population of 80,000, when the revocation of the edict of Nantes deprived it of nearly half its inhabitants, a blow from which it has never recovered. In 1870 Tours was the seat of the government of national defence. Pop. 64,448.

**Tourville, DE, ANNE HILARION DE COL-
ENTIN, COUNT**, a distinguished French admiral, born at Tourville, La Manche, 1642; died at Paris 1701. He entered the navy in 1660, became a captain in 1667, and was created vice-admiral in 1689. He defeated a Dutch and English fleet off Beachy Head in July 1690. In 1692 he was ordered to attack a far superior Dutch-English fleet off La Hogue, and was defeated. He was created a marshal in 1693, and in 1694 destroyed a Dutch and English trading fleet off Cape St. Vincent.

Toussaint-Louverture (tö-saŋ-lö-ver-tür), a distinguished negro, born a slave in the Island of Hayti in 1743. After the insurrection of 1791 Toussaint served in the army of the blacks, and latterly rose to be their leader. He displayed great military and political ability, and in 1796 the French government appointed him general in chief of the troops in San Domingo. After a severe struggle with insurrectionary movements he assumed supreme civil authority, and in 1801 was completely master of the

island. He was appointed president for life of the Republic of Hayti, and under his vigorous government the commerce and agriculture of the island began to revive. But Napoleon did not choose to see him independent, although professedly loyal to France, and sent a powerful expedition to subdue Toussaint, who was forced to surrender. After a vigorous resistance he was seized and sent to France, where he died in prison, 27th April, 1803.

Tower Hamlets, one of the parliamentary divisions of London lying eastward from the Tower. See *London*.

Tower of London, a celebrated ancient fortress in London, consisting of a collection of buildings of various ages on a somewhat elevated position on the north bank of the Thames, outside the old city walls. It covers about 13 acres, and is surrounded by a battlemented wall flanked with massive towers, and encircled by a moat. There is also an inner line of circumvallation broken by towers, and interspersed with other buildings. In the centre is the White Tower, the keep of the old fortress, around which are grouped the chapel, the jewel-house, barracks, and other buildings. The Tower was a first-class mediæval fortress, and served at once as a palace, a prison, and a place of defence. The White Tower was built by Gundulf, bishop of Rochester, for William I. in 1078. It was successively strengthened by various English sovereigns. The regalia, consisting of the royal crowns, sceptres, &c., are now kept and exhibited in the jewel-house. The armoury contains a fine collection of armour and weapons. In the part called the Bloody Tower the two young princes, sons of Edward IV., were murdered. The Tower is now chiefly used as an arsenal, and has a small military garrison of the yeomen of the guard. It is governed by a constable and deputy-constable. The governorship is still a post of distinction. The White Tower was slightly damaged on the 24th January, 1885, by an explosion, the work of Irish dynamitards.

Town. See *City*.

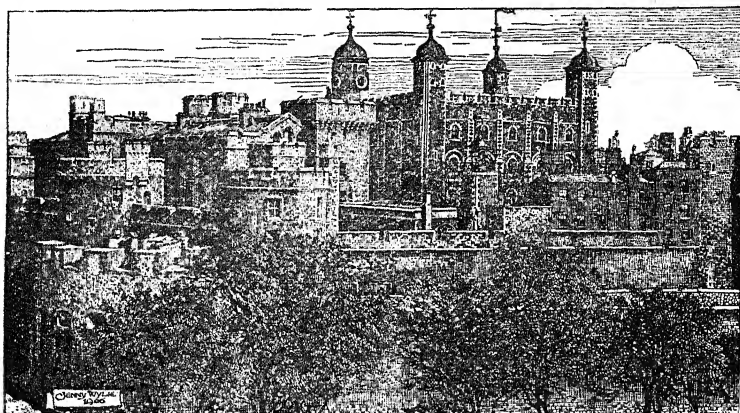
Town-clerk, the clerk to a municipal corporation, elected by the town-council. In England his chief duties are to keep the records of the borough and lists of burgesses, to take charge of the voting papers at municipal elections, and the like. In Scotland he is the legal adviser of the magistrates and council, and the custodian of the burgh records.

TOWN-COUNCIL — TOWNSVILLE.

Town-council, the governing body in a municipal corporation elected by the rate-payers. The principal duties of this body are to manage the property of the borough, impose rates for public purposes, pass by-laws for the good government of the town, for the prevention of nuisances, and the like. The members hold office for three years (one-third of their number retiring every year), but they are eligible for re-election. They elect from among themselves a presi-

dent (called in England a mayor, in Scotland a provost) and magistrates (the aldermen of England and the bailies of Scotland); they also appoint the paid public functionaries of the borough. See *Borough, Burgh*.

Townshend, CHARLES, second viscount, an English statesman, born at Rainham, Norfolk, 1674; succeeded to the peerage December 1687, and took his seat as a Whig in the House of Peers 1695. After acting as a commissioner for arranging the



The Tower of London.

Scottish Union (1706), he was joint plenipotentiary with Marlborough in the conference at Gertruydenburg (1709), and then, as ambassador to the states-general, signed the Barrier Treaty. For this he was censured by the House of Commons, and declared an enemy to the queen and kingdom. He thereupon entered into communication with the Elector of Hanover, who, on his accession as George I., appointed Townshend secretary of state, 1714. In 1717 he became lord-lieutenant of Ireland; and he was again secretary of state from February 1721 to May 1730, when he retired on account of differences with his brother-in-law and colleague, Sir Robert Walpole. He died in 1738.

Townshend, CHARLES, grandson of the above, born 1725, entered the House of Commons 1747, and became a commissioner of trade and plantations in 1749. He was a lord of the admiralty in 1754, member of the privy-council in 1756, secretary of war in 1761-63, chancellor of the exchequer in

1766. He supported Granville's stamp act (1765), and introduced the celebrated resolutions for taxing the American colonies (June 2, 1767). He died in 1767. From so often changing his political opinions he was known as the 'weathercock,' but he had a great reputation for oratory and wit.

Township, in England, the original unit of local government, often coinciding in area with a parish or forming part of one, and not now having any separate legal position. In the United States a township is a subdivision of a county, generally a square of 36 square miles area.

Townsville, the chief municipality of North Queensland, Australia, on Cleveland Bay, about 850 miles n.w. of Brisbane. Being the port of an immense territory, including several gold-fields and a large area of pastoral country, there is a large shipping trade. Extensive harbour improvements are being carried out. The town is well equipped with religious, educational, and other public buildings. Pop. 12,717.

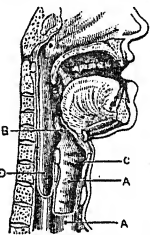
Towton, a village of England, in Yorkshire, 3 miles south-east of Tadcaster. The Lancastrians were completely defeated here in 1461. See *Edward IV.*

Toxicology, the science of poisons and antidotes. See *Poison.*

Tox'otes, a curious genus of fishes. See *Archer-fish.*

Tracery, the ornamental stone-work in the head of a Gothic window, arising from the mullions, and presenting various combinations of curved or straight lines.

Trachea (trākē-a), or **WINDPIPE**, in anatomy, the name given to the tube extending from the larynx (which see) down into the chest to a point opposite the third dorsal vertebra, where the tube divides into two chief divisions or bronchi (which see), one of which supplies each lung with the air necessary for respiration or breathing. The trachea in man is of cylindrical form, about $4\frac{1}{2}$ inches long, and from $\frac{3}{4}$ to 1 inch in diameter, and is composed of from sixteen to twenty rings or zones of gristly or cartilaginous nature, separated and connected by fibrous tissue. Each cartilage forms an imperfect ring, being unclosed behind, and having the gristly edges merely joined by fibrous membrane. The windpipe is lined by delicate mucous membrane which is covered by epithelial cells provided with delicate vibratile processes or *cilia*. All mammals, reptilia, and birds possess a trachea, but some amphibia want this organ; the lungs in such cases springing directly from the larynx. The cut shows the trachea A A, the epiglottis B, the larynx C, and the cesophagus D.



Trachea — Section through part of face and neck.

Tracheotomy, **LARYNGOTOMY**, or **BRONCHOTOMY**, an operation in which an opening is made into the trachea or larynx, as in cases of suffocation.

Trachyte (trāk'it), a compact volcanic rock, breaking with a rough surface, and often containing crystals of glassy felspar, and sometimes hornblende and mica. This rock is extremely abundant among the products of modern volcanoes.

Tracing-paper, transparent paper which enables a drawing or print to be clearly seen through it when laid on the drawing, so that a pen or pencil may be used in trac-

ing the outlines of the original. It is prepared from smooth unsized white paper rendered transparent by a varnish made of oil of turpentine with an equal part Canada balsam, nut-oil, or other oleo-resin.

Tractarianism, the name usually given to a system of religious opinion and practice promulgated within the Church of England in a series of papers entitled *Tracts for the Times*, and published at Oxford between 1833 and 1841. The leaders of the movement, J. H. Newman, E. B. Pusey, John Keble, and other Oxford scholars, sought to mark out a middle course between Romanism and what they considered a rationalistic or latitudinarian Protestantism; but as tract after tract appeared it became clearly apparent that they were pervaded by a spirit unmistakably hostile to Protestantism and favourable to Roman Catholicism. The writers openly showed that they were entirely out of sympathy with the reformers of the 16th century, and boldly taught the doctrines of priestly absolution, the real presence, the paramount authority of the church, and the value of tradition. At last, in tract No. 90, written by Mr. Newman, and published in March 1841, an attempt was made to prove that there was no insurmountable barrier between the Roman Catholic and the Anglican communions; and that the Thirty-nine Articles, though drawn up by Protestants, are susceptible of a Catholic interpretation not inconsistent with the doctrines of the Council of Trent. This tract was condemned by the board of Oxford University as teaching a mode of interpreting the Thirty-nine Articles inconsistent with the statutes of the university, and the bishop of the diocese of Oxford recommended that the series of tracts should terminate with that number, which it did. Many who favoured this movement subsequently went over to the Church of Rome (including Newman), while others remained to form the representatives of the extremely ritualistic or High Church section of the Church of England.

Traction-engine. See *under Steam-engine.*

Trade, **BOARD OF**. See *Board.*

Trade-mark, a peculiar mark used by a manufacturer to distinguish his own productions from those of other persons. Such marks can now be registered and protected in all the more important countries, and between these also there is a general reciprocity as to protection. Regarding trade-marks many nice questions may arise, and

it is not easy to define what constitutes a valid trade-mark. A mere descriptive title or a geographical name will not constitute a proper trade-mark; what it is best to select is some invented word or words, or a word or words having no reference to the character or quality (though suggestive of excellence), some distinctive device, figure, emblem, or design, or a written signature or copy of such. Any mark or name calculated to mislead as to the real nature or origin of the goods will be vitiated. The law relating to this subject in Great Britain is regulated chiefly by the Merchandise Marks Acts of 1862, 1875, and 1887, and the Patents, Designs, and Trade Marks Act of 1883. See also *Merchandise Marks Act*.

Tradescantia, a genus of lily-like plants, nat. order Commelynaceæ. The species are natives of America and India, and many of them are cultivated as ornamental plants in flower-gardens. They are well marked by their three sepals, three petals, three-celled capsule, and filaments clothed with jointed hairs. *T. virginica*, a North American species, is known by the name of *spiderwort*. It has succulent stems, shining grass-like leaves, and blue or purple flowers, and it is common in the flower-borders of English gardens. Other species are cultivated.

Trades-unions. A trade society is defined in the report of the Social Science Committee on the subject appointed at Bradford, in 1859, 'as a combination of workmen to enable each to secure the conditions most favourable for labour;' and although trades-unions, as they are generally called, almost always have other objects in view in addition to that specified in the definition, that object is their distinguishing one. Combinations of this sort in Great Britain are at least three centuries and a half old, but they only became numerous after 1824, when declared no longer illegal. Trades-unions generally endeavour to regulate the prices and the hours of labour, and in many cases the number of men engaged by an employer, the number of apprentices which may be bound in proportion to the journeymen employed by a master, and the like. As accessories these unions may collect funds for benefit societies, and under take the insurance of tools, libraries, and reading-rooms; but their fund, to which every member must regularly contribute a stated sum, is principally reserved for enabling the men to resist, by strikes and otherwise, such action on the part of the employers

as would tend to lower the rate of wages or lengthen the hours of labour. That trades-unions are of advantage to the members, and enable them to benefit by a prosperous state of trade more than they otherwise would, is hardly doubtful; as to their general influence on the industries of a country opinions differ. Some hostility against them has been produced by outrages, of which some of the unions, or members of them, have been guilty, such outrages being directed against the property of employers, or against the persons and tools of non-union men. The intimidation of non-unionists taking work where men are out on strike has also been common. In Britain there has been special legislation to cope with such outrages. But trades-unions have latterly been in greater favour; and by legislation in 1906 they have secured immunity at law, though their members or agents be guilty of 'tortious' acts. The unionists represented at the annual congress number nearly two millions.

Trade-winds, the name applied to those constant winds which occur in all open seas on both sides of the equator, and to the distance of about 30° north and south of it. On the north of the equator their direction is from the north-east (varying at times a point or two of the compass either way); on the south of the equator they proceed from the south-east. The origin of the trade-winds is this:—The great heat of the torrid zone rarefies and makes lighter the air of that region, and in consequence of this rarefaction the air rises and ascends into the higher regions of the atmosphere. To supply its place colder air from the northern and southern regions rushes towards the equator, which, also becoming rarefied, ascends in its turn. The heated air which thus ascends into the upper regions of the atmosphere being there condensed flows northward and southward to supply the deficiency caused by the under-currents blowing towards the equator. These under-currents coming from the north and south are, in consequence of the earth's rotation on its axis, deflected from their course as they approach the equatorial region, and thus become north-east and south-east winds, constituting the trade-winds. The belt between the two trade-winds is characterized by calms, frequently interrupted, however, by violent storms. Trade-winds are constant only over the open ocean, and the larger the expanse of ocean over which they

blow (as in the Pacific) the more steady they are. In some places the trade-winds become periodical, blowing one half of the year in one direction and the other half in the opposite direction. See *Monsoon*.

Tradition, in its general application, is any knowledge handed down from one generation to another by oral communication. It plays a very important part in the Jewish and Roman Catholic Churches. In theology, the term is specifically applied to that body of doctrine and discipline, or any article thereof, supposed to have been put forth by Christ or his apostles, and not committed to writing, but still held by many as an article of faith.

Traducianism. See *Creationism*.

Trafalgar (commonly tra-fal-gár, more correctly tra-fal-gár'), a low and sandy cape on the south-west coast of Spain, at the north-west entrance of the Strait of Gibraltar. The famous naval battle in which Nelson lost his life, after defeating a larger French and Spanish fleet under the command of Villeneuve and Gravina, was fought off this cape, October 21, 1805. The Franco-Spanish fleet lost 19 ships out of 33.

Tragacanth, a variety of gum familiarly termed gum-dragon or gum-tragacanth. It is the produce of several species of the genus *Astragalus*, leguminous plants, natives of the mountainous regions of Western Asia. In commerce tragacanth occurs in small twisted thread-like pieces, or in flattened cakes, in colour whitish or yellowish, devoid of taste or smell. It is demulcent,

and is used in coughs and catarrhs, and to make lozenges and pills. It is employed also in calico-printing.

Tragedy, a dramatic poem, representing an important event or a series of events in the life of some person or persons, in which the diction is elevated and the catastrophe melancholy. Tragedy originated among the Greeks in the worship of the god Dionysus or Bacchus. See *Drama*.

Trag'opan, a name of certain beautiful birds of the genus *Cerionis*, and of the family Phasianidæ, closely allied to the common fowl. *C. satyra*, a common species, is a native of the Himalayas. The plumage is spotted, and two fleshy protuberances hang from behind the eyes. When the bird is excited it can erect these protuberances until they look like a pair of horns. A large wattle hangs at either side of the lower mandible.

Tragopo'gon. See *Goats'-beard*.

Train-bands, a force partaking of the nature of both militia and volunteers, instituted by James I. and dissolved by Charles II. The term was afterwards applied to the London militia, from which the 3d regiment of the line originated, and in which the renowned John Gilpin was a captain.

Training Colleges. See *Normal Schools*.

Trajan, in full, MARCUS ULPÍUS TRAJANUS, Roman emperor, born in Spain 52 A.D., was the son of Trajanus, a distinguished Roman commander under Vespasian. He served against the Parthians and on the Rhine, where he acquired so high a character that Nerva adopted him and created him Cæsar

in 97. Nerva died in 98, and Trajan, who was then in Germany, peaceably succeeded to the throne. He made peace with the German tribes, and proceeded to introduce enlightened measures of reform into the public service. One of his greatest military achievements was his defeat of the Dacians, and



Trajan.

the reduction of Dacia to a Roman province. It is supposed that it was in commemoration of this war that he erected at Rome the column which still remains under his name. In 103 he wrote the famous epistle to Pliny, governor of Pontus and Bithynia, directing him not to search for Christians, but to punish them if brought before him; and on no account to listen to anonymous charges. For some years



Tragacanth (*Astragalus gummiifer*).

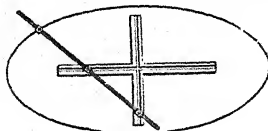
Trajan occupied himself with the work of administration, but in 114 he set out on an expedition against the Parthians which resulted in the reduction of Armenia to a Roman province. He died in Cilicia in 117 A.D., after having nominated Hadrian as his successor. He is said to have been sensual in his private life, but his good qualities as a ruler were such that even 250 years after his death senators greeted a new emperor with the wish that he might be more fortunate than Augustus and better than Trajan.

Trajan's Column. See *Rome*.

Trajan's Wall, a fortified line in the Dobrudsha (Roumania), extending E. from the Danube to Kustendji on the Black Sea, a distance of 37 miles. It is a double, in some places a triple, earthwork on the south side of a natural fosse consisting of a narrow marshy valley. Another wall of the same name, built by a Roman legion, 105-155 A.D., extends from the Pruth E. to the Black Sea.

Tralee', a town and seaport in Ireland, in the county of Kerry, on the river Lee, 55 miles south-west of Limerick. It has an active trade in farm produce. By means of a canal vessels up to 300 tons can discharge their cargoes within 100 yards of the town. Pop. 9867.

Trammel, an instrument for drawing ovals, used by joiners and other artificers.



Trammel.

One part consists of a cross with two grooves at right angles; the other is a beam-compass carrying two pins which slide in those grooves, and also the describing pencil.

Trammel-net. See *Net*.

Tram-silk, silk thread or yarn composed of several single threads. See *Silk*.

Tramways, a kind of street railway introduced within recent times into many of the chief cities of the world. The commonest kind of street tramway is that in which grooved rails are used, the surface of which is nearly on a level with the street. Horse-power is one means used for propelling street cars, on other lines steam-engines are used for the purpose, while in some

again the cars are drawn by underground cables. Latterly electricity has become exceedingly common as the means of propulsion, and has various advantages over other methods. Street tramways were first constructed at New York. The first in England were opened at Birkenhead in 1860, and they have since been introduced into nearly all the principal towns. There are about 2460 miles of tramways in the United Kingdom, the revenue from which in 1903 was £12,439,625, the net receipts amounting to £4,646,962. The U. States have over 30,000 miles of electric tramway.

Trance, a condition resembling sleep, in which consciousness and many of the vital functions are suspended, and during which the action of the heart is diminished and the breathing reduced. The subjects of trance are usually hysterical, and in some cases it is induced by exhausting disease or emotional disturbance. In this condition the face is pale, the limbs relaxed, the mental functions are in abeyance, no effort at rousing will produce a return to consciousness, and this state may last from a period of several hours to many weeks or months. When the trance lasts for a lengthy period food is taken in a mechanical way at intervals by the sleeper. Most cases recover. The term is also applied to a sort of ecstatic state in which some persons are said to fall, and in which, while unconscious of what is passing around them, they have remarkable dreams or visions.

Trani, a seaport in South Italy, province of Bari, on the Adriatic, an archbishop's see, with a 12th-century cathedral, and a good trade. Pop. 28,000.

Tranquebar', a seaport in the district of Tanjore, Madras Presidency, India, formerly a Danish settlement and a busy port. Pop. 14,000.

Transbaikalia, a Siberian province, east of Lake Baikal; area, 236,000 sq. miles. It has an elevated, well-watered surface, and climate dry and extreme both in summer and winter. Agriculture and trade limited; gold found to some extent. Pop. 672,000.

Transcaspia, a territory to the east of the Caspian, belonging to Russia. It has an area of 230,000 sq. miles, mostly uninhabited desert, and is traversed by the Transcaspien Railway, connecting Samarkand with the Caspian. Pop. 382,000.

Transcaucasia, that part of the lieutenantancy of the Caucasus which lies south of the main Caucasus ridge, and which includes

TRANSCENDENTAL—TRANSMIGRATION OF THE SOUL

the governments of Kutais, Tiflis, Elisabethopol, Erivan, Kars, &c. See *Caucasus*.

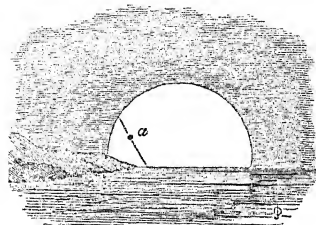
Transcenden'tal, a term applied in the system of philosophy founded by Kant to all those principles of knowledge which are original and primary, and which are determined *à priori*, such as space and time. They involve necessary and strictly universal truths, and so transcend all truth derived from experience, which must always be contingent and particular. The term *transcendentalism* is now generally used in a sense not very different from mysticism, or for that which is vague and illusive in philosophy. In mathematics the term is applied to quantities that cannot be expressed in ordinary algebraic terms.

Transept, in architecture, the transverse portion of a church which is built in the form of a cross; that part between the nave and choir which projects externally on each side, and forms the short arm of the cross in the general plan. See *Cathedral*.

Transfusion, the transmission of blood from the veins of one living animal to those of another, or from those of a man or one of the lower animals into a man, with the view of restoring the vigour of exhausted subjects. This operation is a very old one, but seems to have generally ended in failure until about 1824, the chief cause of failure probably being the want of due precautions to exclude the air during the process. It is now occasionally resorted to as a last resource in cases of great loss of blood by hæmorrhage, especially in connection with labour.

Transit, in astronomy, (a) the passage of a heavenly body across the meridian of any place, a phenomenon which is usually noted by a transit instrument. The determination of the exact times of the transits of the heavenly bodies across the meridian of the place of observation enables the astronomer to ascertain the differences of right ascensions, and the relative situations of the fixed stars, and the motions of the sun, planets, and comets, in respect of the celestial meridians. (b) The passage of one heavenly body over the disc of a larger one; but the term is chiefly restricted to the passage of the inferior planets, Mercury and Venus, over the sun's disc. The transits of Venus are of great importance in astronomy, as they afford the best means of determining the sun's parallax, and consequently the dimensions of the planetary system. These transits are of rare occurrence, four taking place in 243

years, at intervals reckoning from the transit of 1874, in the order of 8, 122, 6, and 105 years, which gives the transit years



Transit of Mercury.

a, Mercury. The dotted line shows the path.

1882 (Dec. 6), 2004, 2012, 2117. The transits of Mercury occur more frequently, but they are of far less astronomical interest, as they cannot be used for the same purpose, the planet being too distant from us.

Transit Instrument, an important astronomical instrument adapted for observing the exact time of the passage of heavenly bodies across the meridian. (See *Transit*.) It consists essentially of a telescope fixed at right angles to a horizontal axis, which latter has its ends directed exactly to the east and west points of the horizon, so that the line of collimation or optical axis of the telescope may move in the plane of the meridian. The instrument is susceptible of certain nice adjustments, so that the axis can be made perfectly horizontal, and at right angles to the plane of the meridian, in which plane the telescope must move. It is generally used in connection with the mural circle (which see).

Transkei, a general name given to a region of South-east Africa north of the Kei river and south-west of Natal, and comprising several territories annexed at various times to the Cape Colony. These are grouped into the four divisions of Griqualand East, Tembuland, Transkei, and Pondoland. Pop. Transkei proper, 355,460 (1707 whites).

Transmigration of the Soul, or **METEMPSYCHOSIS**, the passage which, according to the belief of many races and tribes at all times, the soul after the death of the body makes through the bodies of the lower animals or other human bodies, or, it may be, through plants or inanimate objects. In the teaching of the Brahmanic Hindus it has its foundation in the belief of the connection of all living beings, and of the

gradual purification of the spiritual part of man and its return to the common source and origin of all things—God. The Buddhists accept a similar doctrine, but with them the ultimate goal of the soul is not absorption by the Deity, but annihilation, Nirvana. Transmigration also formed part of the teaching of the Egyptian priests. The doctrine probably passed from Egypt into Greece, where it was never generally current, but was confined to the mysteries and some philosophic systems. It occupied an important place in the system of Pythagoras, and is supported by Plato and Plotinus. Among the Romans Cicero alludes to this doctrine, and Cæsar informs us that it was believed in by the Gauls, who, he says, in this faith were able to despise death. The doctrine is also found in the Talmud, but only a minority of the Jewish rabbis appear to have adopted it. Various heretical Christian sects have held this doctrine, and it was also professed by the Arabs before Mohammed.

Transport, a ship employed by government for carrying soldiers, warlike stores, or provisions from one place to another.

Transportation, a punishment formerly awarded in Britain for crimes of a serious description, but not entailing the penalty of death. It varied in duration from seven years to the term of the criminal's life, according to the offence. The convicts were sent to Australia, Tasmania, and Norfolk Island. In 1857 transportation was superseded by penal servitude, but it was only in 1868 that transportation to Western Australia actually ceased. See *Prison*.

Transubstantiation. See *Lord's Supper*.

Transvaal, a British colony in South Africa, bounded on the south by the Orange River Colony and Natal, on the east by Swaziland and Portuguese East Africa, on the north by Southern Rhodesia, and on the west by the Bechuanaland Protectorate; area, 111,196 square miles. The country is in general a plateau of from 4000 feet or more in elevation, but it is lower in the north. What is called the High Veld is at the height of 5000–6000 feet, the Middle Veld is 4000–5000. The plateau is crossed by a number of mountain ranges, among which the chief are the Magaliesberg, the Witwatersrand, the Drakenberg (culminating in Mauchberg, 8725 feet), and Zoutpansberg, the last two in the east and north-east. The principal rivers are the Limpopo and the Vaal, on the north and south frontiers

respectively, the former flowing to the Indian Ocean, the latter a tributary of the Orange. The other rivers are mostly tributaries of these two, while one or two flow direct to the Indian Ocean, notably the Crocodile and the Komati, which unite and flow into Delagoa Bay. Much the larger part of the country is drained towards the Indian Ocean. The extreme north of the Transvaal is within the tropical zone, but most of the country is extra-tropical. The climate south of the main watershed (between Vaal and Limpopo) is healthy enough, but subject to considerable seasonal and daily extremes. The summer, at the same period as the northern winter, is the wet season and the winter the dry one. The winter is often very cold, and snow occasionally falls. Frosty nights are frequent. North of the watershed much of the country is very unhealthy, especially during the summer, when malaria prevails. Maize and other cereals, with some other crops, such as tobacco, are cultivated in favourable parts, but much of the Transvaal is more suited for stock-raising than for cultivation, and some 50,000 square miles of Low Veld is said to be unfit for settlement. The mining industry is at present far more important than the agricultural and pastoral industries. Gold is mined in several districts, notably in the celebrated 'Rand' district, the total output being over 7,000,000 fine ounces per annum, worth about £28,000,000. Other minerals actually being worked are coal (annual output between 2 and 3 million tons), diamonds, silver, copper, and tin. The manufacturing industries are of little importance. The imports and the exports were valued in the year 1905–06 at about £17,307,000 and £24,503,000 respectively. The imports comprise chiefly machinery, apparel, meat, hardware, ironwork, chemicals, flour, boots and shoes, sugar, furniture, &c.; and the chief exports are gold, diamonds, coal, wool, and tobacco. The Transvaal has railway communication with the Orange River Colony, Cape Colony, Natal, Portuguese East Africa, and Rhodesia. The length of its railways is about 1300 miles. The telegraph lines have a total length of about 2500 miles. The capital is Pretoria, but the largest town is Johannesburg.

The Transvaal first appears in history in 1836, when some of the Boers who had left Cape Colony at the time of 'The Great Trek' (see *Boers*) crossed the Vaal in order

to escape from British rule. With native assistance they soon drove the invading Matabele across the Limpopo, and they afterwards adopted a republican form of government. In 1852, by the Sand River Convention, Britain formally recognized their independence, but it was not till 1860 that the four republics of Potchefstroom, Lydenburg, Utrecht, and Zoutpansberg were welded into a single republic. Three years later Pretoria became the capital. The republic had to face many difficulties, financial and other, and Sir Theophilus Shepstone, a British commissioner with authority from the Imperial government, thought that in 1877 its position justified annexation, and this was accordingly declared. The executive and the president formally protested, and it soon became clear that a large majority of the inhabitants were opposed to annexation. Had the promise of legislative autonomy, however, been carried out without delay, all might have been well, but the Boers were led by repeated refusals to take up arms, and on Dec. 13, 1880, they declared their independence. They at once invested all the British garrisons and cut off their communications. Then followed in quick succession the British disasters at Bronkhurst Spruit, Laing's Nek (Jan. 28, 1881), Ingogo (Feb. 7), and especially Majuba Hill (Feb. 27). These reverses were not allowed by the Imperial government to interfere with the course of negotiations begun prior to them for the modification of the annexation, and peace was concluded upon the basis of a modified Transvaal independence under British suzerainty. This settlement was embodied in the Pretoria Convention of 1881, but in 1884 this convention was superseded by the London Convention, under which the republic, thenceforward to be called the South African Republic, was granted complete internal independence, with the reservation of British control over foreign treaties. Trouble arose soon afterwards in connection with the annexation by the Transvaal of territory in Bechuana-land outside of the limits assigned by the London Convention, but the affair was settled amicably. In 1886 the gold-fields of the Witwatersrand began to attract great numbers of British and others, and these steadily increased from year to year. The difficult questions connected with the naturalization of the Uitlanders (Outlanders), as the new-comers were called, and the

granting to them of the franchise, had to be faced by the republic, which tried to put off the settlement as long as possible. The agitation among the Johannesburg Uitlanders reached a crisis in December, 1895, when a rising was arranged to take place, supported by an armed invasion from the west under Dr. L. S. Jameson, Administrator of Rhodesia. Jameson crossed the frontier on Dec. 29, but owing to some misunderstanding the revolt did not take place, and the 'raiders' were forced to surrender to a Boer force near Krugersdorp on Jan. 2, 1896. The Uitlanders gave up their arms, and the leaders of the internal agitation were tried. Four pleaded guilty to a charge of high treason, and the rest to *lèse-majesté*, but all were eventually released on the payment of various fines and the making of certain declarations. Jameson and his subordinates were handed over to the British government for trial. From that time events steadily drifted towards the disastrous war which began on Oct. 11, 1899, and in which the South African Republic was joined by the Orange Free State. (See *South African War in Supplement*.) After the annexation the country was governed as a crown colony till 1906, when responsible government was granted, the colony being put under a governor and parliament of two houses. The introduction of indentured Chinese labourers in 1904, to work in the gold-mines, led to heated controversy both in South Africa and in Britain, and steps were soon taken to bring the system to an end. According to the South Africa Act of 1909 the Transvaal now forms a province of the Union of South Africa, the other provinces being Cape Colony, Orange River, and Natal, all in future to be under a single parliament (meeting at Cape Town) and a single governor-general; but each province is to have an administrator and a provincial council, the administrator, who is head of the executive, being appointed by the governor-general. The provincial council is elected, and has powers to make ordinances regarding certain specified matters, and four of its members form with the administrator a paid executive committee. Pop. (in 1904), 1,268,716, 299,327 being white, the rest mainly Kaffirs.

Transylvania (German *Siebenbürgen*; Hungarian, *Erdély*), a grand-principality belonging to the crown of Hungary, forming the south-eastern portion of the Austrian

Empire; area, 21,213 square miles. The surface is mountainous, the Carpathian chain covering its southern and eastern frontier, and sending out numerous ramifications into the interior. The chief rivers are the Aluta or Alt, the Maros, and the Szamos, all flowing directly or indirectly into the Danube. The forests are extensive and valuable; the vine flourishes everywhere, and the crops include maize, wheat, rye, hemp, flax, tobacco. The minerals are important, and include gold, silver, copper, lead, coal, salt, and iron. The chief towns are Hermannstadt, Kronstadt, Bistritz, and Szamos-Ujvar. Education is in a very backward state. The population (2,084,048) is very mixed, including Roumanians, Magyars, Germans, Gypsies, Jews, Bulgarians, and others. The country now forms an integral portion of Hungary.

Trap, a term rather loosely and vaguely applied by the earlier geologists to some or all of the multifarious igneous rocks that belong to the palæozoic and secondary epochs, as distinct from granite on the one hand, and the recent volcanic rocks on the other. Trap-rocks often assume a terraced appearance, whence their name from *trappa*, the Swedish for a stair. Their composition may be described as consisting chiefly of felspar and hornblende. Trap-rocks of crystalline structure are distinguished as greenstones, basalts, clink-stones, compact felspar, and felspar porphyries; while the softer and more earthy varieties are known as claystones, claystone porphyries, amygdaloids, trap-tuffs, and wackes. *Basalt* (which see) is the most compact, the hardest, and the heaviest of the trap-rocks. The hill scenery of trappean districts is often picturesque.

Trapa, a genus of plants, order Onagraceæ, consisting of several species, floating in water, and having long jointed root-stocks, with hair-like roots. They yield edible seeds. *T. natans* of Central and S. Europe has received the name of water-caltrops from its four-horned fruits. These, which are called Jesuits'-nuts in Italy, and water-chestnuts in France, are ground into flour and made into bread in the south of Europe. *T. bispinosa* yields the Singharanuts of N. India.

Trà'pani (ancient, *Drepānon* or *Drepānum*), a fortified seaport town in Sicily, capital of the province of the same name, 47 miles w.s.w. of Palermo, on a peninsula shaped like a sickle, and hence its ancient

name, from the Greek *drepanē*, a sickle. It has a cathedral of no great merit, lyceum, nautical school, &c. There is a good trade, and the fisheries are extensive. At a short distance E.N.E. of the town is Mount San Giuliano, the ancient Eryx. (See *Eryx*.) Pop. 37,000.

Trap-door Spider, a name given to certain spiders that have the habit of constructing tubular dwellings in the ground, sometimes a foot or more in depth, and an inch or so in diameter, closed by a sort of hinged door. They belong to several genera, and are found in Southern Europe, Western N. America, and elsewhere. The dwelling is lined with the silky substance spun by the insect, and the hinge of the door is formed of the same, the door itself being constructed sometimes of earthy particles connected by threads, sometimes of leaves, &c. Some species construct nests that have a main tube and one or more branches, the latter having a door where they join the main tube. *Ctenisa Sauvagei* of Corsica, *Nemesia* (*Mygale*) *cementaria* of S. W. Europe, and *Ctenisa californica* of W. America are examples.



Trap-door Spider and Nest.

Trap'ezoid, or TRAPE'ZIUM, a quadrilateral figure of unequal sides, and consequently unequal angles. A trapezoid is usually said to have two sides parallel, but some geometers define the trapezium as having this character.



Trappe, LA, TRAPPISTS. See *La Trappe*.
 Trasime'nus, LACUS. See *Perugia*, *Lago di*.

Trass, a volcanic production, consisting of ashes and scoræ thrown out from the ancient Eifel volcanoes, on the Rhine, near Coblenz. It is equivalent, or nearly so, to the puzzolana of the Neapolitans, and is used as a cement. The same name is given to a coarse sort of plaster or mortar made from several other argillo-ferruginous minerals, used to line cisterns and other reservoirs of water.

Traun, LAKE OF, a small but beautiful lake in Upper Austria, near the town of

TRAUTENAU — TRAWLING.

Gmunden. The river Traun passes through the lake and enters the Danube.

Trautenau (trou'te-nou), a town of Northern Bohemia, in the valley of the Riesengebirge, with flax-spinning and other industries. Pop. 13,290.

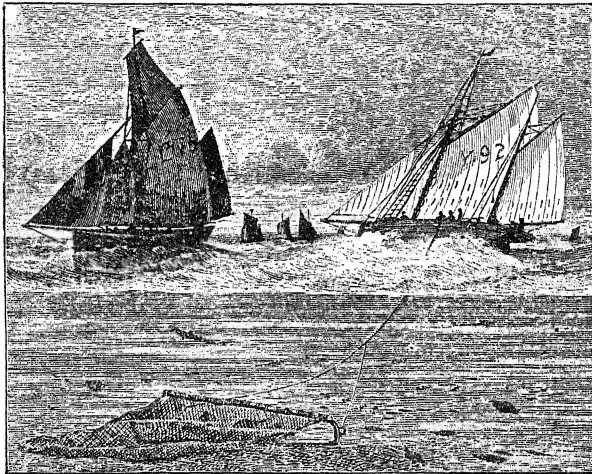
Travancore, a native Indian state, subsidiary to the presidency of Madras, occupying the extreme south-west of the peninsula; area, 6730 square miles. It is for the most part hilly, and is bounded on the east by the Western Ghats, elsewhere chiefly by the sea, having Cape Comorin in the extreme south. The climate is healthy, and the soil fairly fertile. The principal agricultural products are rice, pepper, areca-nuts, cocoa, coffee, tobacco, and oil plants. Some sugar and salt are manufactured. The ruler has the title of Mahārajah; the ruling family is Hindu; the sovereignty and inheritance pass in the female line. Trivandrum is the residence of the rajah. Travancore, the former capital, is small, and now in decay. Pop. 2,951,000.

Traveller's Tree (*Ravenala madagascariensis* or *Urania speciosa*), an arborescent plant, native of Madagascar, having the appearance of a palm, and forming the only species of the genus to which it belongs. Its trunk terminates in a bundle of leaves, each of which is borne by a petiole often 10 feet in length, and has a blade about 6 feet long and 2½ to 3 feet broad. The seeds yield a flour, which is eaten by the natives, and the petioles a limpid and wholesome water, which often renders the tree a great resource for travellers; hence its name.

Travertine, a white concretionary limestone, usually hard and semi-crystalline, deposited from the water of springs holding carbonate of lime in solution. Travertine is abundant in different parts of Italy, and a large proportion of the edifices of ancient and modern Rome are built of this stone.

Trav'esty, a burlesque treatment or setting of a subject which had been originally handled in a serious or lofty manner. The term should never be confounded with *parody*, in which, strictly speaking, the subject-matter and characters are changed, and the language and style of the original humorously imitated; whereas in *travesty* the characters and the subject-matter remain substantially the same, the language becoming grotesque, frivolous, and absurd.

Travnik, a town of Bosnia, on the Lasva.



Trawl-net attached to Fishing-boat.

It has a garrison of Austrian troops. Pop. 5933.

Trawling, a mode of fishing in which a net in the form of a large bag, with special appliances keeping the mouth properly distended, is dragged along the bottom of the sea. It is the mode chiefly adopted in deep-sea fishing, and in British waters has largely developed in recent years, being much prosecuted by small steam-vessels specially built for the purpose, but it is not allowed within three miles of the shore. Cod, whiting, and other white-fish are taken by it in large numbers, and some kinds of flat-fish, as soles, can scarcely be taken in any other way. Trawling can be practised only on a smooth bottom, as a rough bottom would destroy the net. Trawling is sometimes objected to as destroying fish-spawn and immature fish, and so injuring the fishing-grounds. See *Net*

Traz-os-Montes ('Beyond the Mountains'), a north-east frontier province of Portugal; area, 4260 square miles. The province is fertile in parts, and the wine-growing district of Alto Douro is the native country of port. The chief towns are Villa Real and Braganza. Pop. 427,000.

Treacle. See *Sugar*.

Treacle-mustard, a name for the plant *Erysimum cheiranthoides*, also called *worm-seed*. See *Erysimum*.

Tread-mill, an instrument of punishment of modern origin, consisting of a large wheel, about 20 or 25 feet wide, with steps on its external surface, upon which criminals are placed. Their weight sets the wheel in motion, and they maintain themselves in an upright posture by means of a horizontal bar fixed above them, of which they keep hold. The power thus obtained may be applied to the same purpose as water-power, steam, &c. The tread-mill has recently been abandoned in most penitentiaries. It was introduced into the prisons of Great Britain about 1820.

Treason, HIGH. Treason, the *crimen læsæ majestatis* of the Roman law, is that crime which is directly committed against the supreme authority of the state, and is considered to be the greatest crime that can be committed. Formerly in England certain offences against private superiors were ranked as *petit* or *petty treason*, and it was in opposition to such offences that treason against the sovereign was called high treason; but by 9 Geo. IV. cap. xxxi. s. 2, high treason was made the only treason. In a monarchy it is considered to be the betraying or the forfeiting of allegiance to the monarch; but in a republic it has reference to the government or the whole community. The present law of treason in the United Kingdom rests substantially upon the statute of the twenty-fifth year of Edward III., which comprehends the following descriptions, namely: 1, compassing or imagining the king's death; 2, violation of the king's companion (meaning the queen), his eldest daughter, unmarried, or the wife of the eldest son and heir; 3, levying war against the king in his realm; 4, adhering to his enemies in his realm, and giving them aid and comfort in the realm or elsewhere; 5, counterfeiting the great or privy seal; and 6, slaying the chancellor, treasurer, &c. The third of the offences detailed in this statute is now treason-felony, and has a milder punishment than treason annexed to it. (See the next article.) Clause

5 is now repealed. The English law condemns the person convicted of treason to be drawn in a hurdle to the place of execution, there to be hanged, and then beheaded and quartered; and a conviction was followed by forfeiture of land and goods, and attainder of blood; but this is now restricted to hanging, forfeiture and attainder being abolished by 33 and 34 Vict. xxiii. The concealment of treason is called misprison of treason. (See *Misprison*.) In the U. States treason consists in levying war by a citizen against the country, or adhering to its enemies.

Treason-felony, a term commonly used to designate those offences which are pronounced felony by 11 and 12 Vict. cap. xii. (1848), namely, the compassing, imagining, inventing, devising, or intending, first, to deprive the sovereign of any of the royal powers or prerogatives; or, second, to levy war within the realm in order to forcibly compel her to change her measures, or to intimidate either house of parliament, or to excite an invasion in any of her majesty's dominions. Treason-felony is punishable with penal servitude for life or for a term not less than seven years, or with imprisonment for a term not exceeding two years with or without hard labour.

Treasurer, LORD HIGH, the title given in England to a great officer of the crown first appointed by William I. He was intrusted with the management of the king's exchequer. In 1612 the duties of the office were for the first time distributed among commissioners, and since 1715 this has been the regular practice. See *Treasury*.

Treasure Trove, coin, gold, silver-plate, or bullion found hidden in the earth or in any private place the owner of which is not known. In Britain such treasure belongs to the crown; but if the owner is known, or is ascertained after the treasure is found, the owner and not the crown is entitled to it. It is, however, the practice of the crown to pay the finder the full value of the property on its being delivered up. On the other hand, should the finder conceal or appropriate it he is guilty of an indictable offence punishable by fine and imprisonment.

Treasury, the department of a government which has control over the management, collection, and expenditure of the public revenue. The duties of this department in Britain are at present performed by a board of five lords-commissioners instead of a lord high treasurer, as in former times. The

chief of these commissioners, or first lord of the treasury, is, by custom, the head of the administration or prime-minister, and may be a member of either house of parliament. He has an extensive ecclesiastical, legal, and civil patronage, appoints all the chief officers of state, and regulates the various departments under the crown. The virtual head of the treasury is the chancellor of the exchequer. The duties of the three remaining members of the board, the junior lords, are merely formal, the heaviest portion of the executive functions devolving on the two joint secretaries of the department, who are also members of the lower house, and on a permanent official secretary. The treasury has the appointment of all officers engaged in the collection of the public revenue; the army, navy, and civil service supplies are issued under its authority. Several important state departments, as the boards of customs and inland revenue, and the post-office, are under the general authority or regulation of the treasury.

Treaty, an agreement, league, or contract between two or more nations or sovereigns formally signed by commissioners properly authorized, and ratified by the several sovereigns or the supreme power of each state. Treaties are of various kinds, as treaties for regulating commercial intercourse, treaties of alliance, offensive and defensive, treaties of peace, &c. In most monarchies the power of making and ratifying treaties is vested in the sovereign; in republics it is vested in the chief magistrate, senate, or executive council; in the United States of America it is vested in the president by and with the consent of the senate. Treaties may be concluded and signed by diplomatic agents, but these, of course, must be furnished with full powers by the sovereign authority of their states.

Trebbia, a river of North Italy, which rises in the Apennines, and flows into the Po near Piacenza after a course of 55 miles. Here Hannibal defeated the Romans in 218 B.C.

Trebizond' (anciently *Trapezus*), a seaport in Asiatic Turkey, capital of a pashalic of the same name, on the Black Sea. It has an extensive trade, exporting silk, wool, tobacco, wax, oil, &c., from Asiatic Turkey; and silk fabrics, shawls, carpets, &c., from Persia. Pop. estimated at 50,000.

Treble, in music, the highest vocal or instrumental part in a concerted piece, such as is sung by women or boys, or played by

instruments of acute tone, as the violin, flute, oboe, clarinet, &c., or on the higher keys of the piano, organ, &c.: so called because it was originally a *third* part added to the ancient *canto fermo* and the counter-point.

Tredegar, a town of England, in the county of Monmouth, 12 miles west by south of Abergavenny, on the Sirhowy. Near it are valuable mines of coal and ironstone, with extensive blast-furnaces and steel works. Pop. 18,574.

Tree, a perennial plant having a woody trunk of varying size, from which spring a number of branches, having a structure similar to the trunk. Trees are thus distinguished from shrubs, which have perennial stems but have no trunk properly so called; and from herbs, whose stems live only a single year. It is difficult, however, to fix the exact limit between trees and shrubs. Trees are both *endogenous* and *exogenous*, by far the greater number both of individuals and of varieties belonging to the latter class. Those of which the whole foliage falls off periodically, leaving them bare in winter, are called *deciduous*; those of which the foliage falls only partially, a fresh crop of leaves being always supplied before the mature leaves are exhausted, are called *evergreen*. Trees are the longest lived organisms of the vegetable kingdom, and attain a great and indefinite age, far exceeding that of animals. See *Arboriculture*, *Botany*, *Timber*, &c.

Tree-crab, a crab of the genus *Birgus*, included among the land-crabs. It breaks open the shell of the cocoa-nut, &c., by repeated blows of its great claws, in order to feed upon the soft pulp of the nut. Tree-crabs can live for long periods out of water, but deposit their eggs in the sea.

Tree-ferns, the name given to several species of ferns which attain to the size of trees, as the *Alsophila vestita*, *Cibotium Billardieri*, &c. They are found in tropical countries. A handsome species, *Cyathea medullaris*, contains in its trunk a mucilaginous pulp comparable to sago, which is used extensively for food in Polynesia and New Zealand.

Tree-frog, a name of frogs differing from proper frogs in the extremities of their toes, each of which is expanded into a rounded viscous pellet that enables the animals to adhere to the surface of bodies and to climb trees, where they remain during the summer feeding upon insects. *Hyla*

arborca, the only European species, is common in France, Germany, and Italy.

Trefoil, a distinctive title applied to plants of various kinds on account of a peculiarity of the form of the leaf, which consists of three leaflets; examples, buck-bean, clover, and medick. The same term is also applied to an ornamental foliation in Gothic architecture, used in the heads of window lights, tracery, panelling, &c.

Tremato'da, a division of Scolecida, belonging to the group of Platyelmia or flat-worms, and represented by such forms as the flukes or Distomæ (see *Distoma*) and their allies. They are parasitic worms, usually of a flattened or rounded form, and are furnished with one or more suckorial pores, like minute cupping-glasses, for adhesion to the tissues of their hosts.

Trem'olite, a mineral, a variety of hornblende. It is a silicate of calcium and magnesium, is white or colourless, and usually occurs in long, prismatic crystals.

Trench, RICHARD CHENEVIX, D.D., born at Dublin, Sept. 9, 1807, and graduated B.A. at Trinity College, Cambridge, in 1829. He entered the church, and became curate at Hadleigh (1833-35), incumbent at Curdridge (1835-40), curate to Archdeacon Wilberforce at Alverstoke (1840-44), rector of Itchenstoke (1844-45), was Hulsean lecturer 1845-46, professor of theology at King's College, London (1846-58), dean of Westminster (1856-63), and was finally consecrated archbishop of Dublin, 1st Jan., 1864. He was the author of a collection of poems, and a popular writer on philological and theological subjects. Ill health forced him to resign the archbishopric in Nov. 1884, and he died March 28, 1886. His works include *Notes on the Parables* (1841), *Notes on the Miracles* (1846), *On the Study of Words* (1851), *Proverbs and their Lessons* (1853), *Synonyms of the New Testament* (1854), *English Past and Present* (1855), *On Plutarch* (1874), *Lectures on Mediæval Church History* (1878), and many others.

Trenches, the name given in general to all those works which are used in attacking a fortress. See *Siege, Sap, Fortification*.

Trent, a river of England which rises in Staffordshire, 4 miles north of Burslem. It flows through the counties of Stafford, Derby, Nottingham, and Lincoln, and falls into the Humber after a course of 144 miles. It is navigable up to Burton-on-Trent, 117 miles, by barges, and as far as Gainsborough, 25 miles, by vessels of 200 tons.

Trent (German, *Trient'*, L. *Tridentum*), a town in the Tyrol, Austria, picturesquely situated on the left bank of the Etsch or Adige. It is fortified, and has a castle, formerly residence of the prince-bishops, a noble Romanesque cathedral dating from 1212, and other interesting buildings. Trent is a place of great antiquity, having been made a bishopric before 380. The only memorable event in its history is the council which was held in it, and bears its name (see below). Pop. 24,908.

Trent, COUNCIL OF, a celebrated œcumenical council of the Roman Catholic Church, convened to settle various controversies that were agitating the church during the Reformation period, and for the reform of abuses. It met during the pontificate of Paul III. at Trent in 1545, but the wars in Germany caused its transference to Bologna in 1546, when it dispersed. Pope Julius III. again convoked it at Trent in 1551, but it dispersed a year later on the approach of the Lutherans. Eight years afterwards it was again called together by Pius IV., and it finished its labours in 1563. This council definitively settled the doctrines of the Roman Catholic Church. Its decrees are embodied in what is known as the Creed of Pius IV.

Trenton, a city of the United States, capital of New Jersey, on the Delaware at the head of tide-water and steamboat navigation, 50 miles south-west of New York. It is laid out with great regularity, and has a state-house, court-house, governor's house, state-prison, &c. There are numerous manufacturing establishments (pottery, iron goods, woollens, &c.), and the trade is extensive. Pop. 73,307.

Trepang, the sea-slug, a marine animal of the genus *Holothuria*, belonging to the class Echinodermata, order Holothuridæ, popularly known as 'sea-cucumbers,' or bêche-de-mer. It is found chiefly about coral reefs in the Eastern seas, and is a rather repulsive looking animal, somewhat resembling the land slug in shape, and varying in length from 6 to 24 inches. Sun-dried trepangs are in special request in China for making soups. The fishery is carried on in numerous localities in the Indian Ocean, the Eastern Archipelago, and on the shores of Australia.



Trepang (*Holothuria edulis*).

Trepanning, the operation of cutting a circular opening into the skull by means of a surgical instrument called a *trepan* or *trephine*. This consists of a handle, to which is fixed a small hollow steel cylinder, of about $\frac{3}{4}$ to 1 inch in diameter, having teeth cut on its lower edge so as to form a circular saw. Trepanning is especially resorted to for the purpose of relieving the brain from pressure, as in fracture of the skull or in cerebral abscess.

Trespass, in law, a term which is applied generally to any offence against the person or property of another, but is more especially applied to a peaceable but unlawful entry upon the property of another, the remedy for which is by an action of damages. Any injuries committed against land or buildings are in the most ordinary sense of the word trespasses, as entering another's house without permission, walking over the ground of another, or suffering any cattle to stray upon it, or any act or practice which damages the property, or interferes with the owner's or occupier's rights of possession. A creditor or customer can be ordered away by a householder or shopkeeper, and even the civil courts have no power to give a right of entry to officers intrusted with the execution of legal processes, though such officers may maintain possession if once they gain entrance. Trespassers in pursuit of game are liable in Britain to summary prosecution under the game-laws (which see).

Trevelyan, SIR GEORGE OTTO, BART., the only son of Sir Charles E. Trevelyan, and nephew of Lord Macaulay, born in 1838. He was educated at Harrow, graduated at Trinity College, Cambridge, and entered the Indian civil service by competition. He was a member of parliament from 1865 to 1897, and except for a short interval always followed Gladstone's lead. He has held the following official appointments: lord of the admiralty (1868-70), secretary to admiralty (1880-82), chief secretary for Ireland (1882-84), chancellor of the Duchy of Lancaster (1884), secretary for Scotland (1886 and 1892-95). He is author of the *Life and Letters of Lord Macaulay* (2 vols. 1876), *The Early History of Charles James Fox*, &c.

Treves (German *Trier*, Lat. *Augusta Treverorum*), a town in the province of Rheinland, Prussia, on the right bank of the Moselle. It is considered the oldest city in Germany, and has many Roman remains. The streets in the older parts are narrow and irregular. The chief buildings are

the cathedral, built at various times from the 6th century downwards, and containing the Holy Coat (see *Holy Coat of Treves*); the Liebfrauenkirche or Church of our Lady, an elegant Gothic structure; and the old archiepiscopal palace, now used as a barracks. The Roman remains include an amphitheatre, the Porta Nigra (Black Gate), baths, &c. Treves became a Roman colony under Augustus, and subsequently it was the residence of several emperors. It rose to great splendour under the archbishop-electors, who exercised great political influence in Germany. From 1473 to 1797 it had a university. Pop. 45,200.

Treviso, a town of Italy, capital of the province of Treviso, 15 miles N.W. of Venice, on the Sile. It is a walled town with spacious streets and large squares, and has a great number of handsome buildings. The manufactures consist chiefly of silk and cotton goods, machinery, and cutlery. Pop. 28,000.

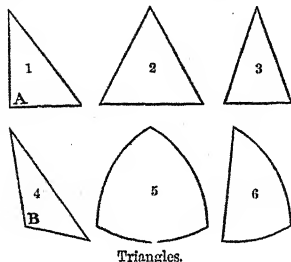
Trevithick, RICHARD, engineer and inventor, born in Cornwall 1771; died 1833. In 1797 he succeeded his father as a leading engineer in Cornish mining. Among his first inventions was an improved pump, which soon came into universal use in deep mining. He next perfected a high-pressure steam-engine, and began to experiment in the construction of locomotive engines. Passengers were first conveyed by steam by means of his road locomotive in 1801, and he soon after successfully worked a tram-road locomotive. His ideas were afterwards taken up and developed by Stephenson. He was the first to recognize the value of iron in ship-building, and the application of steam to agriculture. His request for recognition and reward for his numerous inventions was disregarded by government.

Triad, a trinity, a unity of three. In Welsh literature, the name is given to a class of ancient compositions—moral and historical—comprising enumerations of particulars bound together in knots of three. The *Hindu Triad*, *Trimurti*, or trinity, consists of the three deities *Brahma*, *Vishnu*, and *Siva*, considered as an inseparable unity.

Trial. See *Jury* and *Procedure*, *Civil*.

Triangle, in geometry, a figure bounded by three lines and containing three angles. The three angles of a plane triangle are equal to two right angles or 180°, and its area is equal to half that of a rectangle or parallelogram of the same base and altitude. The triangle is the most important figure in

geometry, and may be considered the element of all other figures. If the three lines or sides of a triangle are all straight, it is a *plane* or *rectilinear triangle*, as in figs. 1, 2, 3, 4. If all the three sides are equal, it is an *equilateral triangle*, as in fig. 2. If two of the sides only are equal, it is an *isosceles triangle*, fig. 3. If all the three sides



Triangles.

are unequal, it is a *scalene triangle*, fig. 4. If one of the angles is a right angle, the triangle is *right-angled*, as fig. 1, having the right angle at A. If one of the angles is obtuse, the triangle is called *obtuse-angled*, as fig. 4, having the obtuse angle B. If all the angles are acute, the triangle is *acute-angled*, as figs. 2, 3. If the three lines of a triangle are all curves, the triangle is said to be *curvilinear*, as fig. 5. If one or two of the sides are straight and others or other curve, the triangle is said to be *mixtilinear*, fig. 6. If the sides are all arcs of great circles of the sphere, or arcs of the same circle, the triangle is said to be *spherical*.

Triangulation. See *Trigonometrical Survey*.

Trias, TRIASSIC SYSTEM. See *Geology*.

Tri'bune (*tribūnus*), in Roman antiquity, originally an officer connected with a tribe, or who represented a tribe for certain purposes; especially, an officer or magistrate chosen by the people to protect them from the oppression of the patricians or nobles, and to defend their liberties against any attempts that might be made upon them by the senate and consuls. These magistrates were at first two, but their number was increased to five and ultimately to ten. This last number appears to have remained unaltered down to the end of the empire. There were also military tribunes, officers of the army, each of whom commanded a division or legion, and also other officers called tribunes; as, *tribunes of the treasury*, of the horse, &c. See *Rome (History)*.

Trichina (*tri-ki'na*), a minute nematoid worm, the larva of which was discovered in 1835 in the tissue of the voluntary muscles of man, giving rise to a disease since known as *trichiniasis* or *trichinosis*. The worm is common also to several other mammals, and especially to the pig, and it is generally from it that man receives the disease. When a portion of flesh, say of the pig, containing larvæ is taken into the stomach the larvæ in a few days become developed into procreative adult worms, having in the meantime passed into the intestines. The male worm is about $\frac{1}{10}$ th of an inch long, the female about a half more. The female produces embryos in extraordinary numbers, which gain entrance into the muscles by penetrating the mucous coat of the intestine and entering the capillaries, whence they are carried to their habitat by the circulation. There they disorganize the surrounding tissue, setting up at the same time morbid action in the system, manifested by swelling of the face, body, and limbs, fever, pains, &c., and resulting sometimes in death. In the muscles they become quiescent, are encased in a cyst covered with calcareous matter, and may give no more trouble. Thorough cooking kills the trichinæ, and thus prevents infection.

Trichiniasis, TRICHINOSIS (*trik-i-ni'a-sis*, *trik-i-nō'sis*), a painful and sometimes fatal disease produced in man by eating meat, especially the flesh of pigs, either raw or insufficiently cooked, infested with *trichina*. See *Trichina*.

Trichinop'oly, a town of British India, capital of district of same name, in the presidency of Madras, on the right bank of the Cavery. It is a military station, and contains a citadel on a granite peak 500 feet high, which commands the surrounding country. The native town lies at the foot of the rock, and beyond it are the European quarters, barracks, hospitals, St. John's Church, with the tomb of Bishop Heber, a Roman Catholic chapel, &c. Pop. 104,721.

Triclin'ium, among the Romans the dining-room where guests were received, furnished with three couches, which occupied three sides of the dinner table, the fourth side being left open for the free ingress and egress of servants. On these couches, which also received the name of triclinium, the guests reclined at dinner or supper. Each couch usually accommodated three persons.

Tricolour, the French national flag, or one formed after the model of it. The French

TRICYCLE—TRIGONOMETRY.

tricolour is blue, white, and red in equal vertical sections, the blue being next the flag-staff.

Tri'cycle, a three-wheeled variety of velocipede, introduced about 1878, and therefore subsequently to the bicycle. The earliest patterns were rear-steering, but were soon superseded by front-steering machines, the latter being steadier. Tricycles were first worked by pedalled levers, but this form soon gave way to the rotary action, which consists of a cranked axle to which the pedals are fixed. This axle is connected by chains running on toothed wheels with the driving axle. The positions and sizes of the wheels, and the steering gear, vary nearly in every make. See *Cycle*.

Tridacna. See *Clam*.

Triden'tine Council, the Council of Trent. See *Trent*.

Triest' (Italian, *Trieste*), a seaport town in Austria, 214 miles south-west of Vienna, on a gulf of same name, at the north-eastern extremity of the Adriatic. The old town, on an acclivity crowned by a castle, has steep and narrow streets, but in the new town the streets are spacious and well paved, and there are handsome thoroughfares and squares. The chief buildings are an ancient cathedral in the Byzantine style, and the exchange block of buildings, which is a handsome edifice. Triest is the chief Austrian port, and the most important trading place in the Adriatic, and has now very extensive harbour accommodation. The imports amount to £15,000,000 or £16,000,000 annually, the exports being several millions less. Triest is the head-quarters of the Austro-Hungarian Lloyd's shipping company, who have extensive ship-building and other establishments here. Triest existed under the Romans (Latin name *Tergeste* or *Tergestum*), but never rose to much importance till about the middle of the 18th century. Pop. 178,672.

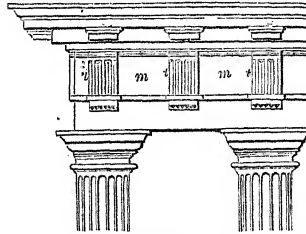
Trifolium. See *Clover*.

Triforium, in Gothic churches, a gallery or open space between the arches of the nave and the roof of the aisles below the clerestory lighted by windows opening into the interior of the building. See *Clerestory*.

Trigger-fishes (*Balistes*), a genus of teleostean fishes, so named from the peculiar structure of the dorsal fin, the first ray or spine of which can only be depressed by the movement of the second ray—the mechanism being thus like that of a gun-trigger.

Tri'glyphs, in architecture, are ornaments in the frieze of the Doric order, repeated

at equal intervals. Each triglyph consists of a square block, on which are cut two per-



Frieze of Roman Doric Order.
m, Triglyphs. m, Metopes.

pendicular channels of triangular section, and one half channel on either side of these.

Trigonometrical Survey, the survey of a country which is carried on from a single measured base-line, by trigonometrical computation made from observed angular distances. The most minute accuracy and the most perfect instruments are required in all the practical parts of such operations; and it becomes necessary to have regard to the curvature of the earth's surface, the effects of temperature, refraction, altitude above the level of the sea, and a multitude of circumstances which are not taken into account in ordinary surveying. In conducting a trigonometrical survey of a country (as the ordnance survey of Britain—see *Ordnance Survey*), signals, such as spires, towers, poles erected on elevated situations, or other objects, are assumed at as great a distance as will admit of distinct and accurate observations by means of telescopes of considerable power attached to the instruments used in measuring the angles. In this way, starting from a measured base-line, the country will be divided into a series of connected triangles called *primary triangles*; and any side of any one of these being known, the remaining sides of all of them may be computed by trigonometry. By means exactly similar, each of these triangles is resolved into a number of others called *secondary triangles*; and thus the positions of towns, villages, and other objects are determined. The length of the base or line measured, which is an arc of a great circle, must be determined with extreme accuracy, as an error in measuring it would affect the entire survey.

Trigonometry, the science of the measurement of triangles. Trigonometry is of

TRIKKALA — TRINCOMALEE.

two kinds, *plane* and *spherical*, the former treating of triangles described on a plane, and the latter of those described on the surface of a sphere. In every triangle there are six things which may be considered, viz. the three sides and the three angles, and the main object of the theoretical part of trigonometry is to deduce rules by which, when some of these are given, the others may be found by computation. In plane trigonometry any three of the six parts of a triangle being given (except the three angles), the other parts may be determined; but in spherical trigonometry, this exception has no place, for any three of the six parts being given, the rest may thence be determined, the sides being measured or estimated by degrees, minutes, &c., as well as the angles. The mode in which trigonometrical definitions are given is as follows:— Let ABC be a right-angled triangle, then

$$\frac{CB}{AC} = \text{sine of } A; \frac{AB}{AC} = \text{cosine of } A; \frac{BC}{AB} =$$

$$\text{tangent of } A; \frac{AB}{CB} = \text{cotangent of } A; \frac{AC}{AB} =$$

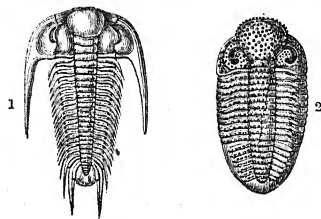
$$\text{secant of } A; \frac{AC}{CB} = \text{cosecant of } A; 1 - \text{cosine}$$

of A = versed sine of A; 1 - sine of A = covered sine of A. Both plane and spherical trigonometry is divided into right-angled and oblique-angled. Solutions of triangles are worked by means of tables of the values of the trigonometrical functions, and the processes are much facilitated by the use of logarithms. See *Logarithm*.

Trik'kala, chief town of a Greek nomarchy in North-west Thessaly. Pop. 17,800.

Trilobites, an extinct and widely-distributed family of paleozoic crustacea, nearly allied to the Phyllopora; some connect them with the Arachnida. Trilobites are especially characteristic of the Cambrian and Silurian strata; a number of genera appear in the Devonian, a few in the Carboniferous, none higher. They are named from the fact that the body is divided into three lobes, which run parallel to its axis. They fed on small water animals, and vast numbers inhabited the shallow water near coasts. When attacked they could roll themselves into a ball. Up till recent times no antennae or limbs belonging to these animals

were known, but latterly a certain number have been found. The eye-lenses are frequently beautifully preserved so as to be



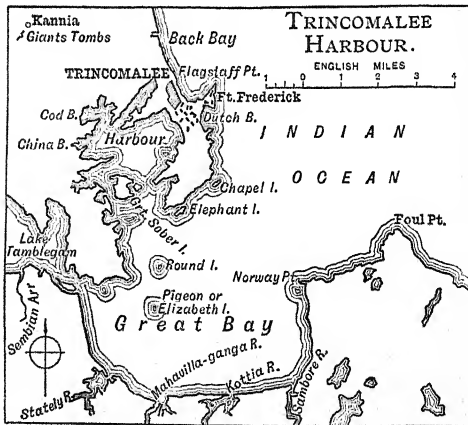
Trilobites.

1, *Paradoxides bohemicus*. 2, *Phacops latifrons*.

perceptible by the naked eye. In *Asaphus caudatus* each eye has 400 facets, and in *A. tyrannus* 6000. The species vary greatly in size, some being no larger than a pin's head, while *A. gigas* is found 18 inches long. Probably some so-called species are only larval or transition forms of others.

Tri'logy, a series of three dramas, each of them in a certain sense complete in itself, yet bearing a mutual relation to each other, and forming but parts of one historical and poetical picture. The term belongs more particularly to the Greek drama, where three tragedies, connected in subject, together with a humorous piece, were performed in immediate succession.

Trimurti. See *Triad*.



Trincomalee', a maritime fortified town of Ceylon, on the east coast. It is an insignificant

TRING—TRINITY HOUSE.

nificant town, but has a noble harbour, which is the principal refuge for shipping in the Bay of Bengal and along the Coromandel coast during the north-eastern monsoon. The town was taken by the British from the Dutch in 1795. Its fortifications have recently been greatly strengthened. Pop. 11 295.

Tring, a market-town of England, in the county of Hertford, 31 miles north-west by west of London. It has manufactures of straw-plait, &c. Pop. (urban dist.), 4349.

Tringa. See *Sandpiper*.

Trinidad, one of the British West India Islands, and, excepting Jamaica, the largest and most valuable. It is the most southerly of the Windward group, lies immediately off the north-east coast of Venezuela, and is about 55 miles long by 40 miles broad; area, 1755 square miles. Its coasts are high and rocky on all sides but the west, and a chain of mountains runs east and west. The chief rivers are the Caroni and the Oropuche. There is a lake of mineral pitch, 90 acres in extent, containing an almost inexhaustible supply. The soil is most fertile, and there are dense forests furnishing excellent timber. The chief products are sugar, cocoa, molasses, rum, cocoa-nuts, pitch, timber, and fruits. The climate is healthy, and though hot is well suited to Europeans. The chief exports are sugar, rum, cocoa, molasses, and pitch. The value of imports and exports amounts each to fully £2,500,000 annually. Trinidad is a crown colony, the public affairs being administered by a lieutenant-governor, assisted by an executive and a legislative committee. It was discovered by Columbus in July 1498, and taken from Spain by the British in 1797. The capital, Port of Spain, on the north-west side of the island, is one of the finest towns in the West Indies. Pop. 255,148.

Trinity, a theological name given to the Deity as expressive of the Christian doctrine of the Triune nature of God, the union of the Father, the Son, and the Holy Spirit as Three Persons and One God. The doctrine of the Trinity is nowhere expressly taught in the Old Testament, but in the New Testament it is clearly taught, though the word Trinity does not occur. The definition of the Trinity adopted by the Catholic Church, and generally accepted by orthodox Christians, is that there are in the Godhead three persons, one in substance, co-eternal, equal in power, the Father, Son, and Holy Ghost. The Eastern Church holds that the

Holy Ghost proceeds from the Father; the Western, throughout all its divisions, adopting the amended form of the Nicene Creed, holds that he proceeds from the Father and the Son. The three creeds commonly called the Apostles', the Athanasian, and the Nicene, all contain the points of agreement between the two divisions of the church, while on the point of difference the Athanasian and the commonly known form of the Nicene express the faith of the Western Church. The term persons is not used in Scripture of the Trinity, but something analogous to the conception of personality seems to be implied in the apostolical arguments of the epistles. See *Arians* and *Sabellius*.

Trinity College, CAMBRIDGE, was formed by Henry VIII. in 1546 by the extension and consolidation of several earlier foundations. The college is the largest in the university. Of the long line of distinguished *alumni* may be mentioned Bacon, Barrow, Newton, Bentley, Dryden, Cowley, Porson, Byron, Macaulay, Hallam, and Tennyson.

Trinity College, DUBLIN. See *Dublin University*.

Trinity College, OXFORD, was founded in 1554 by Sir Thomas Pope, Knt.

Trinity Hall, a college at Cambridge, founded by William Bateman, bishop of Norwich, in 1350, incorporated by act of parliament in the reign of Elizabeth.

Trinity House, London, a society incorporated in 1514 by Henry VIII. for the promotion of commerce and navigation, by licensing and regulating pilots, and erecting and ordering lighthouses, beacons, buoys, &c. The corporation is now empowered to appoint and license pilots for the English coasts, and has a general supervision over the corporations which have charge of the lighthouses and buoys of Scotland and Ireland, subject to an appeal to the Board of Trade, to whose general superintendence the Trinity House is also subject in matters relating to England. The corporation consists of a master, deputy-master, a certain number of acting elder brethren, with an unlimited number of younger brethren. The master and honorary elder brethren are chosen on account of eminent social position, and the other members from officers of the navy or the merchant service who possess certain qualifications. The corporation derives its revenue from lighthouse and other dues. Trinity House, on the north side of Tower Hill, London, was built in 1795.

Trinity Sunday, the Sunday after Whitsunday. It was definitely established as a church festival by Pope John XXII. in 1334. All the principal feasts occur in the half-year between Advent Sunday and Trinity, and all the Sundays from Trinity to Advent are called Sundays after Trinity.

Trio, a musical composition for three voices or for three instruments.

Triple Alliance. Two treaties in European politics are known by this name. The first was formed in 1668 by Great Britain, Sweden, and the Netherlands against Louis XIV.; the second in 1717 by Great Britain, France, and Holland against Spain, then governed by Cardinal Alberoni.

Triplet, in music, a combination of three notes to be played in the time of two. They are joined by a slur and distinguished by having the figure 3 above them.

Tripod, anciently a bronze altar consisting of a cauldron raised on a three-legged stand of bronze. Such was the altar of Apollo at Delphi. Tripods of fine workmanship and of precious metals were placed in later times as votive gifts in the temples, especially that of Apollo.

Trip'oli, a country in the north of Africa, forming a portion of the Turkish Empire since 1835, is bounded on the north by the Mediterranean, west by Tunis, south by Fezzan and the Libyan Desert, and east by the Libyan Desert and Barca; area, about 106,000 square miles, and with Fezzan and Barca, which are included in the Turkish vilayet, about 344,000 square miles. The coast-line, which is 700 to 800 miles in length, including the Gulf of Sidra, or Greater Syrtis, has only one harbour, that of the capital, Tripoli. The eastern part of the interior is mostly barren sand, but in the south and west it is diversified by mountain ranges, attaining a height of about 4000 feet. By far the richest tract of Tripoli is that which stretches about 15 miles along the coast, and includes the capital. It is productive of wheat, barley, millet, and Indian-corn; oranges, pomegranates, lemons, figs, apricots, plums, and other fruits. Abundant rains fall from November to March,

while from May to September the heat is intense, the sirocco often blows, and the thermometer rises as high as from 90° to 92°. The population, which in the outlying districts consists of Berbers and Bedouins, and in the town chiefly Moors, is estimated at 1,150,000.—**TRIPOLI**, the capital, stands on a tongue of land projecting into the sea, has a moderately good harbour, and consists of a great number of narrow and uneven lanes, the chief buildings being the governor's castle, several mosques, synagogues, bazaars, public baths, &c. The trade extends as far as Timbuctoo and Bornou. Pop. about 30,000.

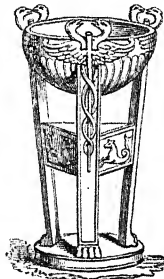
Trip'oli, **TARABOLUS**, or **TRIPOLIS**, a seaport of Syria, capital of a division of the same name, situated on the Mediterranean, 48 miles north-east of Beyrout. There is a trade in silk, wool, cotton, tobacco, galls, &c. Pop. about 24,000.

Trip'oli, a mineral originally brought from Tripoli and used in polishing metals, marbles, glass, &c. It is a kind of siliceous rottenstone, of a yellowish-gray or white colour, rough to the touch, hard in grain but not compact, and readily imbibes water. It is also found in France, Italy, and Germany.

Tripolit'za, a town of Southern Greece, province of Arcadia. Previous to the revolution it was the capital of Morea, but Ibrahim Pasha took possession of it in 1823 and razed it to the ground. It has been partially rebuilt. Pop. 10,465.

Trip'os. See *Cambridge (University of)*.

Triptych (trip'tik), a picture, carving, or other representation in three compartments



Antique Tripod.



Triptych.—Painting by Allegretto Nucci, 1465.

side by side; most frequently such as is used for an altar-piece. The central picture is usually complete in itself. The subsidiary

TRIPTYCH



TRIPTYCH IN METAL AND ENAMEL BY ALEXANDER FISHER

(Purchased by the Government for the Dublin Museum)

The centre panel represents "St. Patrick and the King's Daughters"; the panel on the left, "St. Patrick and the emblem of the Trinity"; and the panel on the right, "St. Patrick and the Roe and Fawn of Armagh".

designs on either side are smaller, and frequently correspond in size and shape to one half of the principal picture.

Trireme, a galley or vessel with three benches or ranks of oars on a side, a common class of war-ship among the ancient Greeks, Romans, Carthaginians, &c. The trireme was also provided with a large square sail, which could be raised during a fair wind to relieve the rowers, but was never employed in action.

Trismegistus. See *Hermes Trismegistus*.

Trismus, a species of tetanus affecting the under jaw with spastic rigidity; locked-jaw. There are two kinds of trismus, one attacking infants during the two first weeks from their birth, and the other attacking persons of all ages, and arising from cold or a wound. See *Tetanus*.

Tristan da Cunha (dă-kyn'yă), the largest of three islands in the South Atlantic (the others being Nightingale and Inaccessible Island), about 1300 miles s.w. of St. Helena. It is mountainous, and one peak rises to the height of 7640 feet. The island was taken possession of by Great Britain in 1817. Pop. 100.

Triticum, an important genus of grasses, that which includes wheat (*T. vulgäre*).

Triton. See *Neut*.

Tritonidæ, a family of marine nudibranchiate, gasteropodous molluscs, many of which are found on the coasts of England, France, and other European countries.

Tritons, in Greek mythology, the name of certain sea-gods. They are variously described, but their body is always a compound of the human figure above with that of a fish below. They carry a trumpet composed of a shell, which they blow at the command of Poseidon to soothe the waves.

Triumph, in Roman antiquity, a magnificent procession in honour of a victorious general, and the highest military honour which he could obtain. It was granted by the senate only to one who had held the office of dictator, of consul, or of prætor, and after a decisive victory or the complete subjugation of a province. In a Roman triumph the general to whom this honour was awarded entered the city of Rome in a chariot drawn by four horses, crowned with laurel, and having a sceptre in one hand and a branch of laurel in the other. He was preceded by the senate and the magistrates, musicians, the spoils, the captives in fetters, &c., and followed by his army on foot, in marching order. The procession

advanced in this order along the *Via Sacra* to the Capitol, where a bull was sacrificed to Jupiter, and the laurel wreath deposited in the lap of the god. Banquets and other entertainments concluded the solemnity. A naval triumph differed in no respect from an ordinary triumph, except that it was upon a smaller scale, and was characterized by the beaks of ships and other nautical trophies.

Triumphal Arch. See *Arch*.

Triumvir, one of three men united in office. The triumvirs (*L. triumviri*) of Rome were either ordinary magistrates or officials, or else extraordinary commissioners who were frequently appointed to jointly execute any public office. But the men best known in Roman history as triumvirs were rather usurpers of power than properly constituted authorities. The term *triumvirate* is particularly applied in Roman history to two famous coalitions, the first in 59 B.C. between Cæsar, Pompey, and Crassus; the second in 43 B.C. between Antony, Octavian, and Lepidus. See *Rome (History)*.

Trivandrum, a town of India, the capital of Travancore state, Madras presidency, situated about two miles from the sea. The town is of considerable importance, has a fort containing the rajah's palace and other buildings, an ancient temple, college with European instructors, medical school, hospitals, Napier museum, various handsome buildings, and a military cantonment. Pop. 57,882.

Trivium, the name given in the middle ages to the first three of the seven liberal arts—grammar, rhetoric, and logic. The other four, consisting of arithmetic, music, geometry, and astronomy, were called the *quadrivium*. See *Arts*.

Troad. See *Troy*.

Trochee, in prosody, a foot of two syllables, the first long and the second short, as *Lat. fāma*, or *Eng. nation*.

Trochilidæ. See *Humming-bird*.

Trochu (tro-shü), LOUIS JULES, French general, born in 1815, died in 1896; educated at St. Cyr; engaged in the Algerian, Crimean, and Italian campaigns; published a pamphlet entitled *L'Armée Française en 1867*, and showed the weakness of the French army, by which he forfeited the favour of Napoleon. At the outbreak of the Franco-German war (1870), however, he was made governor of Paris, and when the republic was proclaimed he was intrusted with the defence of the city, a position which he held until the capitulation. He

wrote *Pour la Vérité et pour la Justice* (1873), *L'Armée Française en 1879*; &c.

Trog'odyte, a cave-dweller; one dwelling in a cave or underground habitation. The ancient Greeks gave the name to various races of savages inhabiting caves, especially to the cave-dwellers on the coast of the Red Sea and along the banks of the Upper Nile in Nubia and Abyssinia, the whole of this district being known by the name *Trog'odytikê*. Archæological investigations show that cave-dwellers everywhere probably preceded house-builders.

Trog'odytes (-têz), the generic name of the wren, and of the gorilla.

Trogon, a genus of birds, the type of the family *Trogonidæ*. The trogons inhabit the forests of the intertropical regions of both hemispheres. There are numerous species, all of them possessing most brilliantly coloured plumage. See *Quezal*.

Troja. See *Troy*.

Trollope, ANTHONY, English novelist, a younger son of Frances M. Trollope, was born in London 1815, died 1882. He was educated at Harrow and Winchester; in 1834 became a clerk in the post-office, and in 1841 was appointed clerk to a post-office surveyor in Ireland. His Irish experiences gave him material for his first novels, *The Macdermots of Ballycloran* (1847), and the *Kellys* and the *O'Kellys* (1848), neither of which was successful. While holding important positions in the post-office (from which he retired in 1867), he continued his novel-writing, his first success being *The Warden* (1855), followed by *Barchester Towers* (1857), *Dr. Thorne* (1858), *The Bertrams* (1859), *Framley Parsonage* (1861), *The Struggles of Brown, Jones, and Robinson* (1862), *Orley Farm* (1862), *The Last Chronicles of Barset* (1867), *Phineas Finn* (1869), *The Way we Live Now* (1875), *The Land-Leaguers* (1883), &c. He also published accounts of his travels, including *The West Indies and the Spanish Main* (1859), *Australia and New Zealand* (1873), *South Africa* (1878), besides a *Life of Cicero* (1881), a sketch of *Thackeray's* life, and his own *Autobiography* (1883). — **THOMAS ADOLPHUS TROLLOPE**, eldest brother of the above, born 1810, died 1892, was educated at Winchester and Oxford; resided chiefly in Florence; and is the author of *Impressions of a Wanderer in Italy* (1852), *Tuscany in 1849-59* (1859), *History of Florence* (1865), &c., besides various novels. — **FRANCES MILTON TROLLOPE**, mother of the above, was

born about 1790, and died in 1863. She was the author of *Domestic Manners of the Americans* (1831), various sketches of travel, &c., and a great many commonplace works of fiction.

Trolls, in Northern mythology, a name of certain supernatural beings, in old Icelandic literature represented as a kind of giants, but in modern Scandinavia regarded as of diminutive size, and represented as a kind of mischievous imps or goblins.

Trombone, a deep-toned brass instrument of the trumpetkind, consisting of three tubes; the first, to which the mouthpiece is attached, and the third, which terminates in



1, Valve Trombone. 2, Slide Trombone.

a bell-shaped orifice, are placed side by side; the middle tube is doubled, and slides into the other two like the tube of a telescope. By the manipulation of the slide the tube of air is altered in length, and the pitch accordingly varied. The trombone is of three kinds, the alto, the tenor, and the bass; and some instruments are fitted with pistons, when they are known as valve trombones.

Tromp, MARTIN HARPERTZDOON, the son of a Dutch naval officer, was born at Briel in 1597. He went to sea with his father in 1607; received the appointment of lieutenant-admiral; gained a decisive victory over the Spanish and Portuguese fleet near Dunkirk in 1639; encountered Blake and Monk in 1653, and in the same year he again encountered Monk and was killed in the battle.—His son, CORNELIUS, born at Rotterdam in 1629, was also distinguished in the naval service of his country. He died in 1691.

Tromsø (trom'seu), a seaport, Norway, capital of the province of Tromsø, situated on a small island of the same name off the west coast. It has an extensive trade in fish, train-oil, &c. Pop. 7500.

Trondhjem (trond'hyem), a seaport on the west coast of Norway, the ancient capital of the country, situated on a bay at the mouth of the Nid, on the south side of the Trondhjem-fiord. It possesses strong fortifications

on the mainland and on the small rocky island of Munkholm. The chief buildings are the cathedral, which in some parts is as old as 1033; the Kongsgaard, or palace of the old Norwegian kings; and a museum, including a picture-gallery, and a library with some rare MSS. The trade consists chiefly in exports of timber, dried and salted fish, tar, and copper. Pop. 40,900.

Troon, a small seaport, Ayrshire, Scotland, between 5 and 6 miles north of Ayr. It is pleasantly situated on a promontory projecting into the sea, and is a favourite sea-side resort, with fine sands and a golfing-links. Pop. 4764.

Troop, a body of cavalry, usually consisting of sixty troopers, under the command of a captain and two lieutenants.

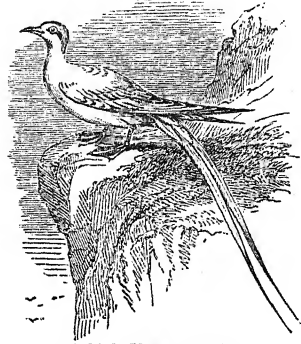
Troopial, the name common to a group of passerine birds, akin to the orioles and starlings. They mostly inhabit the southern United States, but several of them appear as birds of passage in the northern states in early spring. The cow-troopial, cow-bird, or cow-bunting, the blue-bird, and the bobolink or rice-bunting, belong to this group. See these articles.

Tropæolum, a genus of handsome trailing or climbing plants, nat. order Geraniaceæ. The species are all inhabitants of South America. Some of them have pungent fruits, which are used as condiments, and others are prized for their handsome and various-coloured flowers. The principal species are *T. minus*, small Indian cress, the fruit of which is pickled and eaten as capers, and *T. majus*, great Indian cress, the fruit of which is also made into a pickle. See *Nasturtium*.

Trophy, in antiquity, a monument or memorial in commemoration of some victory. It consisted of some of the arms and other spoils of the vanquished enemy, hung upon the trunk of a tree or a stone pillar by the victorious army. The custom of erecting trophies was most general among the Greeks, but it passed at length to the Romans. It was the practice also to have representations of trophies carved in stone, in bronze, or similar lasting substance. In modern times trophies have been erected in churches and other public buildings to commemorate victories, or heroic action in war.

Tropic-bird, the common name of the natatorial or swimming birds belonging to the genus *Phaeton* and to the pelican family, peculiar to tropical regions. There are only two species, the *P. atheræus* and *P. phœnicurus*.

cûrus. They are distinguished by two very long, slender tail-feathers. They are wonderfully powerful on the wing, being able



Tropic-bird (*Phaeton phœnicurus*).

to pass whole days in the air without needing to settle.

Tropics, in astronomy, two circles on the celestial sphere, whose distances from the equator are each equal to the obliquity of the ecliptic, or $23\frac{1}{2}^{\circ}$ nearly. The northern one touches the ecliptic at the sign Cancer, and is thence called the *tropic of Cancer*, the southern one being for a similar reason called the *tropic of Capricorn*. The sun's annual path in the heavens is bounded by these two circles, and they are called *tropics*, because when the sun, in his journey northward or southward, reaches either of them, he, as it were, *turns back*, and travels in an opposite direction in regard to north and south. Geographically the tropics are two parallels of latitude, each at the same distance from the terrestrial equator as the celestial tropics are from the celestial equator. The one north of the equator is called the *tropic of Cancer*, and that south of the equator the *tropic of Capricorn*. Over these circles the sun is vertical when farthest north or farthest south, that is, at the solstices, and they include between them that portion of the globe called the torrid zone, a zone 47° wide, having the equator for its central line.

Troppau, a town, capital of the Duchy of Silesia, Austria, on the right bank of the Oppa, 78 miles north-east of Brünn. It contains a castle of the Liechtenstein family, a townhouse, government offices, a gymnasium, and a library of 35,000 volumes. The manufactures consist chiefly of woollen and

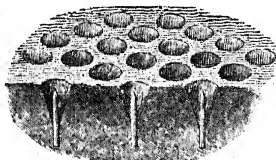
linen cloth, beet-root sugar, beer, liquors, &c. Pop. 26,725.

Tropo, in music, an Italian term for too much.

Trossachs (tros'aks), a beautifully wooded mountain pass in Perthshire, extending for one mile w. from Loch Achray to Loch Katrine, and situated 8 miles w. of Callander. It is amid fine scenery made famous by Scott in his *Lady of the Lake*.

Troubadour, a name given to a class of early poets who first appeared in Provence, in France. The troubadours were considered the inventors of a species of lyrical poetry, characterized by an almost entire devotion to the subject of romantic gallantry, and generally very complicated in regard to its metre and rhymes. They flourished from the 11th to the latter part of the 13th century, their principal residence being the south of France, but they also lived in Catalonia, Arragon, and North Italy. The most renowned among the troubadours were knights who cultivated music and poetry as an honourable accomplishment; but their art declined in its later days, when it was chiefly cultivated by minstrels of a lower class. See *Trouvère* and *Provençal*.

Trous-de-loup (trö-dé-lö), a military term for trap-holes or pits dug in the ground in



Trous-de-loup.

the form of inverted cones or pyramids, in order to serve as obstacles to the advance of an enemy, each pit having a pointed stake in the middle.

Trout, the common name of various species of the genus *Salmo*, or salmon, as the bull-trout (*S. eriox*), the salmon-trout (*S. trutta*), the common trout (*S. fario*), and the great gray or lake trout (*S. ferax*). The common trout abounds in all the rivers and lakes of Northern Europe, and is found even in the smallest streams. A trout of 1 lb. weight is reckoned a good fish, and though a weight far in excess of that is frequent, many streams produce none nearly so large. The Lochleven trout, found in the loch of that name, is a distinct species (*S. levenensis*). The brook-trout of America is *S. fontinalis*,

and the common American lake-trout *S. conifinis*. There are, however, several species of lake-trout in America, among the finest and largest of which is the Mackinaw trout or namaycush (which see). The great gray or lake trout of Britain weighs sometimes 30 lbs., while the North American lake-trout may reach 60 lbs. See *Salmon*.

Trouvère (trö-vär), a name given to the ancient poets of Northern France, corresponding to the *Troubadour* of Provence. Their productions partake of a narrative or epic character, and thus contrast broadly with the lyrical, amatory, and more polished effusions of their southern rivals. See *France (Literature)*, and *Troubadour*.

Trouville (trö-vël), a seaport and favourite French bathing place, department of Calvados (Normandy), at the mouth of the Touques. Pop. 5749.

Trover, in English law, formerly an action against a man who was in possession of the goods of another, and refused to deliver them to the owner. It is no longer a technical form of action.

Trowbridge, a market-town, England, county of Wilts, on the river Biss, 25 miles north-west of Salisbury. In the parish church, which was built in the 14th century, there is a monument to the poet Crabbe, who was rector here from 1814 to 1832. The manufactures are woollen cloths, kerseymeres, bedding; and engineering and brewing are carried on. Pop. 11,526.

Troy, or **ILIUM** (Greek, *Troia* or *Ilion*), an ancient city in the Troad, a territory in the north-west of Asia Minor, south of the western extremity of the Hellespont, rendered famous by Homer's epic of the *Iliad*. The region is for the most part mountainous, being intersected by Mount Ida and its branches. There have been various opinions regarding the site of the Homeric city, the most probable of which places ancient Troy at the head of the plain bounded by the modern river Mendereh, supposed to be the Scamander of Homer, and the Dombrek, probably the Homeric Simois. The Ilium of history was founded about 700 B.C. by Æolic Greeks, and was regarded as occupying the site of the ancient city, but this is doubtful; it never became a place of much importance. The ancient and legendary city, according to the Homeric story, reached its highest splendour when Priam was king; but the abduction of Helen, wife of Menelaus, king of Sparta, by Paris, one of Priam's sons, brought about its destruction. To

revenge this outrage all the Greek chiefs afterwards famous in history banded themselves against the Trojans and their allies, and went against Troy with a great fleet. The first nine years of the war were spent by the Greeks in driving the Trojans and their allies within the walls of the capital. The tenth year brought about a quarrel between Achilles, the bravest of the Greeks, and Agamemnon, the Greek commander-in-chief, which proved for a time disastrous to their party, and which forms the subject of the Iliad. In the end the city was taken by means of a large hollow wooden horse, in which a number of the bravest of the Greek heroes concealed themselves, while the rest retired to their ships. Thinking that the Greeks had given up the siege, the Trojans incautiously drew the horse within the city, and gave themselves up to revelry. The Greeks within the horse issued from their concealment, and being joined by their companions without the walls, Troy was taken and utterly destroyed. This is said to have occurred about 1184 B.C. Not only has the site of the ancient city been disputed, but the legends connected with it are held by some scholars to have no historical foundation; but this view has been altered by the excavations of Schliemann, and his discovery of the remains of a prehistoric city or cities at Hissarlik, the site of the historic Ilium.

Troy, a town of the United States, capital of Rensselaer county, New York, on the left bank of the Hudson river. It has a fine court-house, a polytechnic institute, &c. Its industries turn out shirts, collars and cuffs, machinery and iron goods, railway rolling-stock, paper, wood pulp, optical instruments, knitted goods, &c. Its trade is facilitated by the river, the Erie Canal, and the railways. Pop. 60,651.

Troyes (tro-à), a town, France, capital of the department of Aube, on the Seine, 100 miles N.E. of Paris. The principal edifices are the cathedral, a fine Gothic building, the churches of St. Urbain and St. Madeleine; the town-house, the prefecture, &c. The manufactures chiefly consist of cottons, woollens, hosiery, soap, artificial flowers, paper, gloves, &c. Pop. 59,600.

Troy Weight, a weight chiefly used in weighing gold, silver, and articles of jewelry. The pound troy contains 12 ounces; each ounce is divided into 20 pennyweights, and each pennyweight into 24 grains. Hence the pound contains 5760 grains, and the ounce 480 grains. As the avoirdupois pound

(the weight in general commercial use) contains 7000 grains, and the ounce 437½ grains, the troy pound is to the avoirdupois as 144 to 175, and the troy ounce to the avoirdupois as 192 to 175.

Truce, a suspension of arms by agreement of the commanders of opposing armies; a temporary cessation of hostilities, either for negotiation or other purpose. The *truce of God* was a suspension of arms which occasionally took place in the middle ages, and was introduced by the church in order to mitigate the evils of private war. This truce provided that private feuds should cease at least on the holidays from Thursday evening to Sunday evening each week, during the season of Advent and Lent, and on the octaves of the great festivals.

Truck System, the practice of paying the wages of workmen in goods instead of money. This practice has prevailed in various places and trades, particularly in the mining and manufacturing districts of Britain, and the workmen have often had to pay exorbitant prices for their goods. Several acts of parliament have been passed with the object of abolishing the system.

Truffle, a genus (*Tuber*) of fungi of the section Gasteromycetes, growing underground. The common truffle (*T. cibarium*) is of a fleshy fungous structure and roundish figure, without any visible root; of a dark colour, approaching to black, and studded over with tubercles, and varies in size from that of a large plum to that of a large potato. It grows abundantly in some parts of England, Italy, and the south of France. It is much sought after as an ingredient in certain high-seasoned dishes. There being no appearance above-ground to indicate the existence of the truffle, dogs are trained to find this fungus by the scent and scratch it up.

Trujillo (truj-el'yo). See *Truxillo*.

Trullan Councils, two ecclesiastical conventions, the first held by the Emperor Constantine Pogonatus (680), the second by Justinianus II. (692), which take their name from the great hall in the imperial palace of Byzantium where they met.

Trumpet, a wind-instrument of music of the highest antiquity, having a clear ringing and penetrating tone. In its modern form it consists of a metal tube (usually brass, sometimes silver), about 8 feet long at its greatest length, doubled up or bent to form three longish folds, and expanding into a bell-shaped end, the other end being fitted with a mouthpiece by which the instrument

is sounded. The trumpet tuned on C produces with great power and brilliancy the following series of tones in an ascending scale: C in the second space of the bass clef, G, C, E, G, B \flat , C, D, E, and G. By means of crooks and slides the length of the tube can be increased, and the pitch correspondingly lowered. Trumpets are also sometimes fitted with pistons, valves, or keys, by which the intermediate tones and semitones can be produced.

Trumpet, HEARING. See *Ear-trumpets*.

Trumpet, SPEAKING. See *Speaking-trumpet*.

Trumpeter (*Psophia*), a genus of grallatorial or wading birds, found in South America, and so named from their hollow cry. The most familiar species is the Agami or golden-breasted trumpeter (*P. crepitans*), a bird of the size of a pheasant, which is readily tamed, and becomes a favourite inmate of the house.

Trumpet-fish. See *Bellovs-fish*.

Trumpet-flower, a name applied to various large tubular flowers, as those of the *Bignonia*.

Trumpets, FEAST OF, a feast among the Jews, held on the first and second days of the month Tisri, which was the commencement of the Jewish civil year. It derived its name from the blowing of trumpets in the temple with more than usual solemnity.

Trumpet-shell. See *Conch*.

Trumpet-weed, a large South African sea-weed, *Ecklonia buccinalis*, the stem of which being hollow is used as a siphon, and also as a trumpet.

Trumpet-wood. See *Cecropia*.

Trunk-fish. See *Ostracion*.

Trunk-hose, a kind of short wide breeches gathered in above the knees, or immediately under them, and distinguished according to their peculiar cut as French, Gallic, or Venetian. This garment prevailed during the time of Henry VIII., Elizabeth, and James I.

Truro, an episcopal city, seaport, and municipal borough, England, county of Cornwall, at the confluence of the Kenwyn and St. Allen, 8 $\frac{1}{2}$ miles N. of Falmouth. The principal edifice is the new cathedral (the first Protestant cathedral, except St. Paul's, built in England), consecrated in 1887, cost over £100,000; Truro being established as a bishopric in 1877. The smelting of tin is carried on. Vessels of 100 tons can come up to the town. Truro ceased to be a parliamentary borough in 1885, but gives name to a parl. div. Pop. 11,562.

Truss, in surgery, a bandage or apparatus used in cases of hernia to keep up the reduced parts and hinder further protrusion, and for other purposes.—In building, a combination of timbers, or of iron-work, or of both together, so arranged as to constitute an unyielding frame. The simplest example of a truss is the principal or main couple of a roof, in which the tie-beam is suspended in the middle by the king-post to the apex of the angle formed by the meeting of the rafters. See *Roof*.

Trustee, in law, a person to whom property is legally committed in trust for the benefit of some other party or parties, or for some special purpose. The person for whom or in whose favour the trustee holds the estate, or any interest therein, is called the *cestui que trust*. No one is compelled to undertake a trust, but if he once accept he cannot renounce it unless the trust-deed contains a provision enabling him to do so, or a competent court grants him a discharge, or by the consent of all those beneficially interested in the estate. Trustees are liable for the consequences of any breach of trust however innocent, and the estate of a trustee deceased, who has misapplied the trust fund, is liable for the deficiency; but generally speaking, the law only requires of a trustee the same amount of care and prudence he would be expected to display in managing his own affairs. Where there are several



Trunk-hose.

1, Charles IX. of France, 1550-1574.

2, Robert Carr, Earl of Somerset, died 1645.

trustees, each is liable for his own acts and receipts only, unless where there has been common agreement and authorization. As their office is considered purely honorary,

TRUXILLO—TUBEROSE.

trustees are not entitled to any allowance for their trouble in connection with the trust. They may not invest the trust-funds on personal security, or in stock of a private company, unless specially authorized to do so by the trust-deed; but they are permitted to invest in government stocks, stock of the Bank of England, debenture, preference, or guaranteed stock of railways, stock of municipal corporations, and generally on satisfactory real security.

Truxillo, or **TRUJILLO** (both *try-hēl'yō*) (1), a town of Western Spain, prov. of Cáceres, birthplace of Pizarro. Pop. 12,500. (2) A town (also called *Chimú*) in the north of Peru, near the coast, and having as its port Salaverry. It was founded by Pizarro, has a university, and a good trade. Pop. 8000.

Trygon'idæ, the family name of the sting-rays (which see).

Tsarskoe-selo, **ZARSKOJE-SELO** ('Czar's Town'), a town of Russia, in the province of St. Petersburg, 14 miles south of the capital, with a summer residence of the imperial family, erected in 1744 by the Empress Elizabeth. Pop. 14,603.

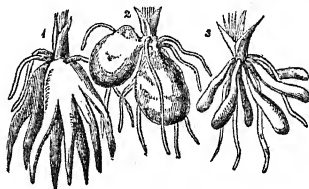
Tsetse-fly, a South African dipterous (two-winged) insect (*Glossina morsitans*), akin to the gad-fly, whose bite is often fatal to horses, dogs, and cows, but is innoxious to man and wild beasts. It is a little larger than the common house-fly, and the symptoms of its bite are that the eyes and the nose begin to run, the coat stares as if the animal were cold, a swelling appears under the jaw and sometimes at the navel, and if the animal does not die at once, emaciation commences, and continues unchecked until, perhaps months afterwards, purging comes on, and the animal perishes in extreme exhaustion. The mischief arises from disease germs or microbes conveyed by the insect.

Tuam, a town of Ireland, county of Galway, 129 miles north-west from Dublin. It is the seat of the Bishop of Tuam, and also of the Roman Catholic archbishop. Its principal edifices are the Protestant and Roman Catholic cathedrals, the bishops' palaces, and the college of St. Jarlath. Pop. 2896.

Tuamotu Islands, **PAUMOTU**, or **LOW ARCHIPELAGO**, an extensive group of islands in the Pacific, lying eastwards from the Society Islands and south of the Marquesas. They are mostly under French protection, and have a population of 6773. They export pearls, mother-of-pearl, trepang, &c.

Tua'regs, **TUARICKS**, or **TAWA'RIKS**, a race of nomads, allied to the Berbers, and inhabiting a great part of the Sahara between 5° w. lon. and 13° e. lon. They wear a black masque or face-cloth, are of a handsome and muscular physique, of warlike habit, and followers of Mohammed. Their numbers are estimated at 300,000.

Tuber, in botany, an underground fleshy stem or appendage to the root, being usually an oblong or roundish body, of annual duration, composed chiefly of cellular tissue with



Tuberous Roots.

1, Palmate (*Orchis maculata*). 2, Didymous (*Orchis maculata*). 3, Fasciculate (*Ficaria ranunculoides*).

a great quantity of amylaceous matter, intended for the development of the stems or branches which are to spring from it, and of which the rudiments, in the form of buds, are irregularly distributed over its surface. Examples are seen in the potato, the Jerusalem artichoke, and arrow-root. Tubers are distinguished, according to their forms, into *didymous* (in pairs), *palmate* (hand-like), *fasciculate*, *globular*, *oblong*, &c.

Tu'bercle, in pathology, a small aggregation of round cells which tends to spread and invade surrounding tissues. In doing so it breaks down in the centre into an opaque, yellowish or cheesy material, carrying the normal tissue with it in its destructive change. Tubercles may be developed in different parts of the body, but are most frequent in the lungs and mesentery. Tubercles in the lungs are the cause of the well-known fatal disease consumption (which see).

Tuberculos'is, the term applied to a general disease due to the formation of tubercles (see *Tubercle*) in various organs of the body. The prevalence of tuberculosis in cattle, and the possibility of tuberculous cattle communicating the disease to human beings through the medium of the meat of slaughtered animals sold for food, have recently occasioned profound anxiety and much discussion among veterinary surgeons.

Tuberose (*Polyanthes tuberosa*), a plant of the natural order Liliacæ, originally

brought from the East, and now largely cultivated under glass in Europe both for its perfume and for its beautiful white flowers. It has a bulbous root, and an upright branchless stem growing to the height of 3 or 4 feet. It is cultivated for the perfumers in France and Italy.

Tubic'olæ ('tube-dwellers'), an order of annelids, comprehending those which live in calcareous tubes, composed of secretions from the animal itself, as in *serpula* (which see); in tubes composed of sand and fragments of shell connected together by a glutinous secretion, as in *terebella*; or in a tube composed of granules of sand and mud, as in *sabella*.

Tübingen (tü'bing-in), a town of Württemberg, in the circle of the Schwarzwald (Black Forest), on the Neckar, 18 miles south-west of Stuttgart. It is irregularly built, and the streets are for the most part steep and narrow, but the environs are picturesque. There are various manufactures, but the town is supported chiefly by the university, which was founded in 1477. It has a library of 300,000 vols., a botanic garden, chemical laboratories, collections of zoology and comparative anatomy, of minerals, of coins and medals, &c. The number of teachers is nearly 100, of students over 1200. Reuchlin and Melancthon were professors here, as was also F. C. Baur, who founded the Tübingen school of theology, a school which has been distinguished by its critical method, and its tendency to the rejection of the supernatural element in Christianity. Pop. 15,338.

Tubip'ora, a genus of corals belonging to the order Alcyonaria, and represented by the familiar organ-pipe coral (*T. musica*), and by other species.

Tubuai Islands, a group in the Pacific Ocean, south of the Society Islands, and, like them, under France.

Tubular Bridge. See *Bridge*.

Tuckahoe, a singular vegetable found in the southern seaboard states of the North American Union, growing underground, like the European truffle. It is also called *Indian bread* and *Indian loaf*. It is referred to a genus *Pachyma* of hymenomycetous fungi, and has been named *P. cocos*, from having some resemblance to a coco-nut. It is too bitter for eating.

Tucker, ABRAHAM, miscellaneous and philosophical writer, born 1705, died 1774. He was educated at Oxford, lived the life of a private country gentleman, and pub-

lished his chief work, *The Light of Nature*, under the pseudonym of Edward Search. It has been frequently republished.

Tuckerman, HENRY THEODORE, American man of letters, born in Boston 1813, died 1871. His writings are very numerous, and consist mainly of monographs relating to biography, literature, and art. Among the best known are *Italian Sketch Book*; *Artist Life*; *The Optimist Characteristics of Literature*; *Essays, Biographical and Critical*; &c.

Tucson, a town of the U. States, capital of Pima co., Arizona; inhabitants chiefly engaged in mining and stock-rearing. Pop. 7531.

Tucum, a species of palm (*Astrocaryum vulgäre*) of great importance to the Brazilian Indians, who make cordage, bow-strings, fishing-nets, &c., from the fine durable fibre consisting of the epidermis of its unpanded leaves. The name is also given to the fibre or thread, and to an oil obtained from the plant.

Tucuman', or **SAN MIGUEL DE TUCUMAN**, a town of the Argentine Republic, capital of the province of same name, in the north-west of the country, near the foot of a mountain range on the Upper Rio Dulce. It is a rising place, connected by railway with Buenos Ayres. Pop. about 34,300. The province is fertile, and has a fine climate; area, 13,500. Pop. 249,433.

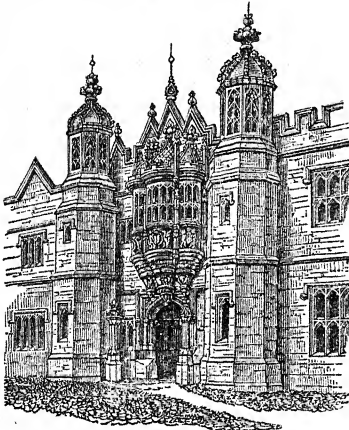
Tude'la, a city, Spain, province of Navarre, on the right bank of the Ebro, 156 miles north-east of Madrid. It has an ancient cathedral and other churches, a medical college, &c. Pop. 8923.

Tudor, the family name of an English royal line founded by Owen Tudor of Wales, who married the widowed queen of Henry V. The first of the Tudor sovereigns was Henry VII.; the last, Elizabeth. See *England*.

Tudor-flower, a trefoil ornament much used in Tudor architecture. It is placed upright on a stalk, and is employed in long rows as a crest or ornamental finishing on cornices, ridges, &c.

Tudor Style, in architecture, a name frequently applied to the latest Gothic style in England, being the last phase of the perpendicular, and sometimes known as *Florid Gothic*. The period of this style is from 1400 to 1537; but the term is sometimes extended so as to include the Elizabethan period also, which brings it down to 1603. It is the result of a combination of the Italian style with the Gothic. It is char-

acterized by a flat arch, shallow mouldings, and a profusion of panelling on the walls.



Tudor Architecture: Hengrave Hall, Suffolk, 1538.

Tuesday, the third day of our week, so called from the Anglo-Saxon god of war, *Tiu*. See *Tyr*.

Tufa, or **TUFF**, the name originally given to a kind of volcanic rock, consisting of accumulations of scoria and ashes about the crater of a volcano. The name is now applied to any porous vesicular rock; thus rounded fragments of greenstone, basalt, and other trap rocks, cemented into a solid mass, are termed *trap-tuff*, while a vesicular carbonate of lime, incrusting and incorporating twigs, moss, shells, and other objects that lie in its way, is called *calc-tuff*.

Tuileries (twēl-rēz; from Fr. *tuile*, a tile, because the spot on which it was built was formerly used for the manufacture of tiles), the residence of the French monarchs, on the right bank of the Seine, in Paris. Catharine de' Medici, wife of Henry II., began the building (1564); Henry IV. extended it, and founded the old gallery (1600); and Louis XIV. enlarged it (1654), and completed that gallery. The side towards the Louvre consisted of five pavilions and four ranges of buildings; the other side had only three pavilions. During the revolution of 1830 the palace was sacked. It was restored by Louis Philippe to its former splendour, but in 1848 it was again pillaged. The Tuileries then became an hospital for wounded, a picture-gallery, and the home of Louis Napoleon in 1851. On the 23d May, 1871, it was almost totally

destroyed by fire (the work of the communists), and the remaining portions were removed in the year 1883.

Tula, a government of Central Russia; area, 11,954 square miles. The surface is generally flat, and the principal rivers are the Oka, the Upa, and the Don. By canal there is communication with the Baltic, the Black Sea, and the Caspian. Much grain is produced, and vast numbers of horses, cattle, and sheep are reared. Iron is smelted and manufactured to a large extent. Pop. 1,409,432.—**TULA**, the capital, is situated on the Upa, 107 miles south of Moscow. It is the residence both of a civil and a military governor, the see of a bishop, and has extensive manufactures of fire-arms, as also cutlery, ornamental steel-work, platina snuff-boxes, silks, hats, soap, candles, cordage, and leather. Pop. 111,048.

Tula-metal, an alloy of silver, with small proportions of lead and copper, forming the base of the celebrated Russian snuff-boxes popularly called platinum boxes.

Tule (tō'la), a large species of rush or sedge, *Scirpus validus*, nat. order Cyperaceæ, which grows to a great height, and covers large tracts of marshy land in parts of California, being also found generally throughout the United States.

Tulip, a genus of plants (*Tulipa*), nat. order Liliaceæ. The species are bulbous herbaceous plants, inhabiting the warmer parts of Europe and Asia Minor, and are now extensively cultivated in gardens. About forty species have been described, of which the most noted is the common garden tulip (*T. gesneriana*), a native of the Levant, and introduced into England about 1577. Upwards of 1000 varieties of this plant have been enumerated. The wild tulip (*T. sylvestris*), a doubtful native of Britain, has yellow flowers, and blooms in April and May. The sweet-scented tulip (*T. suaveolens*) is much prized for its fragrance. About the middle of the 17th century an extraordinary tulip mania prevailed in Holland. Enormous sums were given for bulbs, the ownership of a bulb being often divided into shares, in which men speculated as they do in ordinary stocks or shares.

Tulip-tree, an American tree bearing flowers resembling the tulip, the *Liriodendron tulipifera*, nat. order Magnoliaceæ. It is one of the most magnificent of the forest trees in the temperate parts of North America. Throughout the States it is generally known by the name of poplar, white wood,

TULLAMORE—TUNBRIDGE WELLS.

or canoe-wood. The wood is light, compact, and fine-grained, and is employed for various useful purposes. The bark, especially of the roots, has an aromatic smell and bitter taste, and has been used in medicine as a tonic and febrifuge.

Tullamore, a town, King's County, Leinster, Ireland, on the Clodagh river, 58 miles west of Dublin. There are two breweries, a large distillery, aerated mineral-water works, &c. Pop. 4639.

Tulle (tül), a town, France, capital of the department of Corrèze, situated on the Corrèze, 115 miles N.N.E. of Bordeaux. It has a cathedral and episcopal palace, a communal college, a diocesan seminary, court-house, &c., and manufactures of firearms (state factory), drugget, wax-candles, playing-cards, leather, &c. Pop. 14,000.

Tulle, a kind of open silk lace once manufactured at Tulle in France, and much used on ladies' caps, &c.

Tulloch, JOHN, D.D., born in 1823 at Bridge of Earn, Perthshire; died 1886. He was educated at St. Andrews and Edinburgh universities; became minister of St. Paul's, Dundee, in 1845; Kettins, Strathmore, in 1849; and in 1854 received the appointment to the principalship of St. Mary's College, St. Andrews, a position which he held until his death. He was an influential leader in the councils of the Scotch Church, and the author of the Burnet prize essay on Theism (1855), Leaders of the Reformation (1859), English Puritanism and its Leaders (1861), Rational Theology and Christian Philosophy in England in the 17th century (1872), Pascal (1878), Facts of Religion and Life (1877), besides many articles in the North British, Edinburgh, Contemporary, and other reviews. The latter review he had a share in founding, and he was the last editor of Fraser's Magazine.

Tullus Hostilius, according to the legend, third king of Rome and successor to Numa Pompilius (B.C. 670-638), a warlike monarch, in whose reign took place the combat of the Horatii and Curiatii.

Tultcha, a town of Roumania, on the Danube, which near it divides into its three chief mouths. It has a good trade. Pop. 21,826.

Tumbrel, **TUMBREL**, a covered cart or carriage with two wheels, which accompanies troops or artillery, for conveying the tools of pioneers, carriages, and the like.

Tumour, in surgery, in its widest sense, a morbid enlargement or swelling of any

part of the body or of any kind; more strictly, however, it implies a permanent swelling occasioned by a new growth, and not a mere enlargement of a natural part, which is called hypertrophy. Tumours may be divided into two well-defined classes: (a) *Simple, benign, or innocent tumours*, the substance of which has anatomical resemblance to some tissues of the body; they gradually increase in size, and generally only produce inconvenience from the great bulk they sometimes attain; a complete cure may be effected by simple excision. (b) *Malignant tumours*, which bear no resemblance in substance to normal tissue; they are exceedingly liable to ulceration, they invade all the textures of the part in which they occur, affecting the mass of the blood, and terminate fatally; when excised they are apt to recur not only in the immediate neighbourhood of the previous site, but also in remote parts of the body. This recurrence in remote parts is due to transference of some of the elements of the tumour by means of lymphatic or blood vessels. Hence if a malignant tumour is to be excised it must be done early to avoid such secondary infection if possible. Innocent tumours are often named from the tissues in which they occur, as *adipose or fatty tumours, fibrous tumours, cartilaginous tumours, bony tumours*, and the like. Of the malignant class cancer is a well-known example. See *Cancer*.

Tumuli, artificial mounds of earth or stone raised to mark the resting-place of the dead. See *Barrows*.

Tun, an old measure of capacity. The English *tun* of wine contained four hogsheads, or 252 gallons, but in Britain all higher measures than the gallon are no longer legal.

Tunbridge, or **TONBRIDGE**, a town of England, in Kent, on the Medway, 11 miles S.W. of Maidstone. It has a handsome church, grammar-school, public hall, and manufactures of gunpowder and fancy wooden wares. Pop. 12,736.

Tunbridge Wells, a market-town and watering-place, England, partly in Kent, partly in Sussex, pleasantly situated 32 miles south-south-east of London. It has a spacious parade, a town-hall, corn exchange, public halls, Pump Room for visitors taking the waters, Convalescent Home for Children, and manufactures of toys and fancy articles. The spring to which the place owes its origin and prosperity is chalybeate,

and is considered very efficacious in cases of weak digestion. Pop. 33,388.

Tundras, a term applied to the immense stretches of flat, boggy country, extending through the northern part of Siberia and part of Russia, where vegetation takes an arctic character. They are frozen the greater part of the year.

Tungsten, a metal discovered in 1781; atomic weight 184; symbol W (from its other name *wolfram*). It has a grayish-white colour and considerable lustre. It is brittle, nearly as hard as steel, and less fusible than manganese. The ores of this metal are the native tungstate of lime and the tungstate of iron and manganese, also known by the name of *wolfram*. The metal is occasionally mixed with iron.

Tunguses, a name given to certain Mongolian tribes in the north-east of Asia, consisting of nomadic and hunting peoples, spread over Eastern Siberia. In a wider sense the term Tungusians is used to include the Manchus, who conquered China in 1644.

Tunic, an ancient form of garment in constant use among the Greeks. Among the Romans the tunic was an under garment worn by both sexes (under the *toga* and the *palla*), and was fastened by a girdle or belt about the waist. The term is also used ecclesiastically to denote a dress worn by the sub-deacon, made originally of linen, reaching to the feet, and then of an inferior silk, and narrower than the dalmatic of the deacon, with shorter and tighter sleeves.

Tunica'ta, a class of animals formerly regarded as molluscous or molluscoid, but now regarded as lowly or degenerate vertebrates. They are enveloped in a coriaceous mantle, with two orifices, one branchial and the other anal, and covering beneath it a second tunic, which adheres to the outer one at the orifices. These animals are popularly named *sea-squirts*, and are found either solitary or in groups, fixed or floating. See *Ascidia*.

Tuning-fork, a steel instrument with two prongs, designed when set in vibration to give a musical sound of a certain fixed pitch. The ordinary tuning-fork sounds only one note—usually the middle or tenor C in Britain, and A in Germany; but some are made with a slider on each prong, which, according as it is moved up or down, regulates the pitch of the note produced.

Tunis, a country of North Africa, now a French protectorate, is bounded on the north

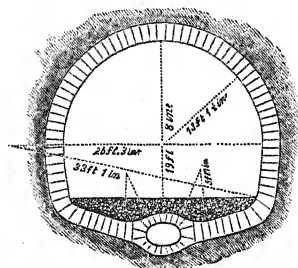
and north-east by the Mediterranean, on the south-east by Tripoli, and on the west and south-west by Algeria; area, estimated at 64,000 square miles. The coast-line presents three indentations, forming the Bay of Tunis on the north and those of Hammamet and Gabes or the Lesser Syrtis on the east. The north-west portion of the country is traversed by the Atlas Mountains, which on their lower slopes have many fertile tracts, partly under culture. Between these mountains and the Gulf of Hammamet on the east stretches the extensive plain of Kairwan. The only river of consequence is the Mejerdah. Agriculture is the chief industry; wheat, barley, and oats are grown; olive plantations are numerous, and other products are grapes, dates, cork, and esparto. The country has much mineral wealth, chiefly lead, zinc, iron, salt, and phosphates. The fisheries are valuable. Some woollens, leather, carpets, saddlery, slippers, pottery, &c., are manufactured. The inhabitants, about 2,000,000 in number, consist chiefly of Arabs and Berbers, with about 60,000 Jews. There are about 40,000 French, nearly 70,000 Italians, and many Maltese. In ancient times Tunis belonged to the Carthaginians, afterwards formed part of the Roman province of Africa, was subdued about 675 by the Arabs, became a powerful state under independent rulers in the 13th century, and in 1575 was incorporated in the Ottoman Empire. In 1881 the French invaded Tunis, owing to the turbulence of the tribe called Kroumirs, and soon became masters of the country, though it is still nominally under a native bey, and is called a 'Regency'.—The exports, comprising chiefly phosphates, olive-oil, wheat, barley, oats, zinc, esparto, cattle and sheep, woollens, and lead, amount to over £3,000,000 annually. The trade is mostly with France. There are 600 miles of railway. Tunis, Sfax, Susa, and Bizerta are the chief seaports.—TUNIS, the capital, lies on a salt lagoon connected with the Bay of Tunis by a narrow channel, where is the port of Goletta, there being another salt lagoon on the other side of the city. Both Tunis and Goletta are built of the materials of ancient Carthage. One of the chief buildings is the palace of the bey in the Moorish style; the bazaars are interesting, and under French direction a cathedral and other buildings have been erected, and schools, &c., established. Tunis is now

TUNKERS—TURANIAN.

connected directly with Goletta and the sea by a deep channel cut through the lagoon. Pop. about 170,000.

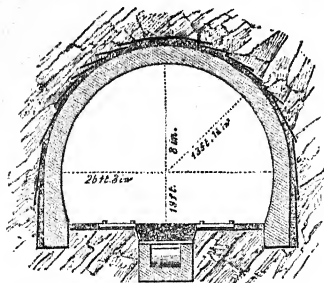
Tunkers. See *Dunkers*.

Tunnel, a subterranean passage cut through a hill, a rock, or any eminence, or under a river, a town, &c., to carry a canal, a road, or a railway in an advantageous course. In the construction of canals and



St. Gothard Tunnel. Section showing construction in soft strata.

railways tunnels are frequently had recourse to in order to preserve the desired level and for various other local causes. Tunnels when not pierced through solid rock have usually an arched roof and are lined with brick-work or masonry. The sectional form of the passage is various. Among the greatest



St. Gothard Tunnel. Section near entrance on Italian side.

works of this kind are the tunnels of the Simplon, the longest of all (12½ miles), St. Gothard, Mont Cenis, and the Arlberg. In Britain the Severn and Mersey tunnels are noteworthy, while in America the Hoosac tunnel and that through the Cascade range in Washington territory are the most important. (See the various headings.) There is a project, which as yet has been refused the

sanction of the British government, to construct a tunnel under the Straits of Dover.

Tunny, a fish of the genus *Thynnus* and family Scomberidae, the *T. vulgaris*, closely allied to the mackerel. These fish live in shoals in almost all the seas of the warmer and temperate parts of the earth. They are taken in immense quantities on the Mediterranean coasts, where the fishing is chiefly carried on. The flesh is delicate and somewhat resembles veal. The common tunny attains a length of from 4 feet to even 20 feet, and sometimes exceeds half a ton in weight. Its colour is a dark blue on the upper parts, and silvery white below. The American tunny (*T. secundo-dorsalis*) is found on the American coast from New York to Nova Scotia. The albacore (*T. pacificus*) and the bonito are allied species.

Tunstall, a town of England, in Staffordshire, 4 miles N.E. of Newcastle-under-Lyme, and included in parl. bor. of Newcastle. It is a busy place, with manufactures of china and earthenware, bricks and tiles, &c. The district is rich in coal and ironstone. Pop. 19,492.

Tupaia, a genus of remarkable mammals. See *Canerina*.

Tupelo, a North American forest tree of the genus *Nyssa*, the *N. denticulata*, nat. order Santalaceæ. It is a lofty tree of great beauty. The same name is given to other species of the genus, some of which are also called *black gum*, *sour gum*, *gum tree*, *piperidge*, &c.

Tupper, MARTIN FARQUHAR, born in London 1810, died 1889. He was educated at the Charterhouse and Christ Church, Oxford; studied law, and was called to the bar at Lincoln's Inn. He published a number of novels and plays, but his fame rests upon his *Proverbial Philosophy* (1838), a work in a kind of blank verse which has gone through numerous editions. His reminiscences are to be found in *My Life as an Author* (1886).

Turanian, a term appellative of one of the great classes into which human speech has been divided, and including the Ugrian or Finnish, Samoyedic, Turkish, Mongolian, Tungusic, and possibly the Dravidian. It is called also *Altaic* and *Scythian*. It is characterized as *agglutinate* and *polysynthetic*, from the fact that its words are polysynthetic, or composed of several distinct words, each, even in composition, retaining its significance. See *Philology*.

Turban, a form of head-dress worn by the Orientals. It varies in form in different nations, and different classes of the same nation. It consists of two parts: a cap without brim, fitted to the head; and a sash, scarf, or shawl, usually of cotton or linen, wound about the cap, and sometimes hanging down the neck.

Turbellaria, an order of Annuloida, of the class Scolecida, almost all the members of which are aquatic and non-parasitic. There are two sub-orders, Planarida and Nemertida. See these articles.

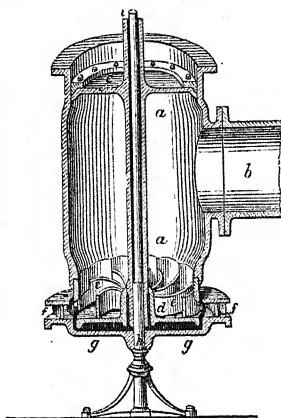
Turbine, a kind of horizontal water-wheel, made to revolve by the escape of water through orifices, under the influence of pres-

sure the reservoir. Here, by virtue of its pressure, it tends to escape by any aperture which may be presented; but the only apertures consist of those between a series of curved float-boards, *ff*, fixed to a horizontal plate *g*, mounted upon a central axis *h*, which passes upwards through a tube connecting the upper and lower covers, *c* and *d*, of the vessel *a*. Another series of curved plates *ee*, is fixed to the upper surface of the disc *d*, to give a determinate direction to the water before flowing out at the float-boards, and the curves of these various parts are so adjusted as to render the reactive force of the water available to the utmost extent in producing a circular motion, and thus carrying round the disc and the axis *h* with which the machinery to be impelled is connected. For steam turbines see *Turbine* in *Supp*.

Turbot (*Rhombus maximus*), a valuable food-fish of the family Pleuronectidæ or flat-fishes. Next to the halibut, the turbot is the largest of the Pleuronectidæ found on the British coast, and is the most highly esteemed for the table. It is of a short and broad form, brown on the upper side, which is usually the left side, and attains a large size, sometimes weighing from 70 to 90 lbs. The American or spotted turbot (*Rhombus maculatus*), common on the coasts of New England and New York, attains a weight of 20 lbs.

Turdus, the genus of birds to which the thrush belongs.

Turenne, HENRI DE LA TOUR D'Auvergne, VICOMTE DE, Marshal of France, born in 1611 at Sedan, was the second son of Henri de la Tour d'Auvergne, duke of Bouillon, and of Elizabeth, princess of Nassau-Orange. He learned the art of war under his uncles Maurice and Henry of Nassau in the Dutch service, entered the service of France in 1630, served with distinction in Germany and North Italy, and in 1643 received the command of the army of the Rhine in the Thirty Years' war, and was made a marshal. His successes in this post, as in the battle of Nördlingen (1645), greatly contributed to the close of the war. During the disturbances of the Fronde the victories of Turenne led to the termination of the civil war. In the war against Spain he also distinguished himself, and after its close in 1659 he was named marshal-general of France. When war was renewed with Spain in 1667 he conquered Flanders in three months. In the Dutch war of 1672 Turenne had the chief command. He first marched against



Section of Turbine.

sure derived from a fall. Turbines are now made after a vast variety of patterns. The oldest and simplest is the Scotch turbine, or Barker's mill (which see). In another common form the water passes vertically down through the wheel between the fixed screw blades, which give it a spiral motion, and then strike similar blades attached to a movable spindle, but placed in the opposite direction, so that the impact of the water communicates a rotatory motion to the blades and spindles. Or the water may be passed from the centre horizontally outwards through fixed curved blades, so as to give it a tangential motion, and thereby cause it to act on the blades of the wheel which revolves outside. In the annexed cut the water is introduced into a close cast-iron vessel *a* by the pipe *b*, connecting it with

TURGOT—TURKEY.

the Elector of Brandenburg, and having driven him back as far as the Elbe forced him to sign the Treaty of Vosses in 1673; while in the brilliant campaign of 1674-75 he destroyed two Austrian armies by the battles of Mühlhausen and Türkheim, and conquered and devastated the Palatinate. In 1675 he was killed while making preparations to engage Montecuculi.

Turgot (tür-gō), ANNE ROBERT JACQUES, was born at Paris in 1727, and died 1781. He was educated for the church, but renouncing this purpose he studied law, and in 1671 was appointed intendant of Limoges, which post he occupied for twelve years. Shortly after the accession of Louis XVI. in 1774 Turgot was appointed comptroller-general of France, and in order to reform the political and financial condition of the country, he moderated the duties on articles of the first necessity, freed commerce from many fetters, and encouraged industry by enlarging the rights of individuals, and abolishing the exclusive privileges of companies and corporations. Such, however, was the opposition of the clergy and nobility to his reforms that he was dismissed from office in 1776, and retired into private life.

Turgueneff. See *Tourgueneff*.

Turin (Italian, *Torino*), a city of North Italy, capital of province of same name, at the confluence of the Dora Riparia with the Po, and between those two rivers. The city is essentially modern, the streets being broad and regular, and many of them are lined with arcades, while there are numerous wide squares and gardens. The chief buildings are the cathedral, a renaissance building, completed in the beginning of the 16th century, and remarkable for its marble façade; the royal palace, a plain brick building, which contains the king's private library, with valuable MSS., and the royal armoury; the university, a fine edifice recently constructed, in which there is a large library; the Palazzo dell' Accademia delle Scienze, with a picture-gallery and museums of natural history and antiquities; the Palazzo Carignano, used at one time by the Sardinian and Italian parliaments when they met here (1848-65), and now given up to a collection of natural history; the Madama Palace, an old and interesting building, and several theatres. The environs of the city are beautiful, and offer many objects of interest. Among the educational establishments, in addition to the university, which is attended by over 2000 students, are an epis-

copal seminary, a royal military academy, a polytechnic school, and various other colleges and schools. The manufactures consist, besides the staple of silk, chiefly of woollens, cottons, linen, paper, ironmongery, earthenware, and porcelain. Turin was anciently the capital of a tribe called the Taurini, and under the Roman Empire was called Augusta Taurinorum. It was long the capital of Savoy, then of the Sardinian kingdom, and from 1861 to 1865 of United Italy. Pop. 335,639.

Turkestan, a wide region of Central Asia, roughly divided into two portions, Eastern Turkestan and Western Turkestan. Eastern or Chinese Turkestan is inclosed on three sides by lofty mountain ranges (Thian-Shan, Karakorum, Kuen-Lun), and on the east has the desert of Gobi. Near the centre is the basin of the Lob-nor, a lake fed from the west by the Tarim and its tributaries. The greater part of this area is uncultivated steppe, but there are fertile portions watered by the rivers Kashgar, Yarkand, and Karakash. The products include cereals, root-crops, and cotton in large quantities, partly manufactured in the country. Carpets and felt cloths, along with silk, which the country produces abundantly, are exported to India, Kashmere, and Tibet; while opium, tea, linens and woollens are imported. The inhabitants, who are mostly Mohammedans, are very mixed. In 1863 a rebellion broke out, and after a war of several years Eastern Turkestan succeeded, under Yakoob Beg, in effecting its separation from the Chinese Empire, but after his assassination in 1877, it was again brought under Chinese sway. The chief towns are Kashgar and Yarkand, and the pop. is estimated at 580,000.—**WESTERN TURKESTAN** comprises the southern portion of Russian Central Asia, from Eastern Turkestan to the Caspian, and includes the khanates of Khiva and Bokhara. This extensive region is watered chiefly by the Oxus or Amu Darya, and the Jaxartes or Sir Darya. Maize, millet, rice, and cotton are cultivated in many places, and trade has greatly increased since the Russian occupation. Pop. about 7,000,000. A portion of this territory forms the Russian general-government of Turkestan, with Tashkend as chief town; area, 410,000 sq. miles, pop. 4,896,822.

Turkey, a Mohammedan state of South-eastern Europe and Western Asia, under the rule of a sultan. In Europe it occupies a considerable portion of the Balkan penin-

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sula, and in this portion is situated the capital, Constantinople, but the larger part of Turkey is in Asia. The *immediate* possessions of Turkey in Europe, or those directly under the sultan's rule, extend from Montenegro, Bosnia, Servia, and Southern Bulgaria on the north to the Ægean and Greece on the south, and from the Black Sea to the Adriatic, the Straits of Otranto, and the Ionic Sea. The Treaty of Berlin in 1878 greatly reduced the area under direct Turkish rule, besides confirming the independence and extending the limits of several of the formerly tributary states. (See *Ottoman Empire*.) The tributary principality of Bulgaria made itself an independent kingdom in 1908, and the same year the semi-detached provinces of Bosnia and Herzegovina, administered by Austria, were finally annexed to the dual monarchy. The immediate possessions in Europe have an area of 65,350 sq. miles, pop. 6,200,000; in Asia, 693,610 sq. miles, pop. 16,900,000; in Africa (Tripoli, &c.), 398,900 sq. miles, pop. 1,000,000. Total, 1,157,860 sq. miles; pop. 24,100,000. A number of islands in the Ægean belong to Turkey. Crete and Samos are autonomous. Egypt also is nominally part of the Turkish dominions.

European Turkey.—European Turkey is traversed in different directions by mountain chains belonging to the great system of South-Eastern Europe, of which the Balkan is the best known range. In the east the chief range is Rhodope, running in an east-and-west direction; in the west are Shardagh and Grammos, continued north-westwards under various names into Bosnia and Herzegovina. The most important river basin is that which drains into the Archipelago or Ægean Sea, which receives the Vardar, the Struma, the Mista or Karasu, and the Maritza. The Adriatic and Ionian Seas receive from Turkey no rivers worthy of notice, and the Sea of Marmora receives only a few mountain torrents. There are several plains remarkable for their fertility and beauty. The climate is not so mild as its latitude might seem to indicate, the winter being severe; but the summer heat is excessive. For the production of the ordinary cereals no part of the world is more admirably adapted. The principal grains are maize, wheat, and barley, while rice, millet, and buckwheat are produced, as also flax, hemp, sesame, and madder. The cultivation of tobacco and cotton is very general. Among fruits the figs are highly esteemed; the cul-

tivation of the olive is carried on along the coasts of the Archipelago and the Adriatic; wine is an important product in many districts; and much attention is paid in some parts to the growing of roses (for otto or attar). There are few manufactures except in Constantinople, Adrianople, and Salonica, and these are of little importance.

Turkey in Asia comprises the peninsula of Asia Minor, the country intersected by the Euphrates and the Tigris, the mountainous region of Armenia between their upper courses and the Black Sea, the ancient lands of Syria and Palestine, and the coast strips of Arabia along the Red Sea and Persian Gulf. Omitting Arabia, the country consists mainly of (1) a high plateau traversed by the mountains of Taurus and Anti-Taurus, and stretching from the Archipelago to the borders of Persia; (2) a plateau of less elevation and extent (Syria and Palestine) traversed by the double range of Lebanon; and (3) the extensive plain of Mesopotamia on the Lower Tigris and Euphrates. (See *Asia Minor, Armenia, Kurdistan, Mesopotamia, Syria, and Palestine*.) The islands Chios, Lesbos, Rhodes, &c., belong to Turkey in Asia, while the island of Samos is a tributary principality, and Cyprus is held by Britain. The chief towns in Asiatic Turkey are Smyrna, Damascus, Bagdad, Aleppo, and Beyrout.

Commerce, Communications, &c.—The chief exports are raisins, figs and dates, silk, cotton, wool and mohair, opium, coffee, barley, wine, valonia, olive-oil, and tobacco; while the imports are cotton, woollen, and silk goods, metals, iron, steel, glass wares, &c. In 1907 the exports from European and Asiatic Turkey to Britain amounted to £6,005,524; the imports from Britain to £7,809,627; the total Turkish exports are £17,885,000, the imports £28,515,000. Constantinople and Salonica have direct railway communication with central Europe. There are about 3500 miles of railway in the empire, and large extensions are being made. The length of telegraph lines is about 26,000 miles. Accounts are usually kept in piastres, the value of which is something less than 2½d. sterling; a hundred piastres make a Turkish *lira* or gold *medjidie* (value about 18s.), and 500 make a 'purse'. The unit of weight is the *oke*, about 2½ lbs. avoirdupois. The usual linear measure is the *arshin*, equal to 30 inches.

People.—The inhabitants of the Ottoman Empire are of very diverse races. First in

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order are the Osmanli Turks, who, as the dominant race, are diffused over the country. They are proprietors of the greater part of the soil, fill all the civil and military offices, live generally in towns employed in various trades, and are seldom agriculturists. The Greeks form the bulk of the population over great part of the Aegean coasts and islands, and constitute to a very considerable extent the mercantile and trading community of Turkey. Arnauts, or Albanians, are found in the west throughout Albania; the north-west is occupied by Servians; and Bulgarians are numerous in the districts of the country that are adjacent to Bulgaria. In Asiatic Turkey the Turks are an important element, but there are also numbers of Armenians, Arabs, Kurds, Jews, Greeks, Circassians, &c. The Turkish language belongs to the Turanian family of languages, and is allied to the Hungarian and the Finnish. The literature is considerable in bulk, but not very original, consisting in great part of translations from the Persian and the Arabic, and in recent times from European literature.

Government.—The government of Turkey is despotic (but a constitution was granted in 1908). The monarch, usually designated the sultan, is regarded by Mohammedans as the caliph or head of Islam. His government is often spoken of as the Sublime Porte. The public officers who conduct the administration under the sultan are divided into three classes. The first class is that of law and religion, and at their head is the Sheik-ul-Islam, who governs a judicial and ecclesiastical body called the Ulemas. The second class consists of the 'officials of the pen,' or the members of administration, and at their head is the grand-vizier or Sadrazam. The third class includes the 'officials of the sword,' at their head being the Seraskier or minister of war, and the Capudan Pasha or minister of marine. The supreme deliberative body is the divan or privy-council, with the grand-vizier at its head, other members being the Sheik-ul-Islam and the ministers of war, marine, finance, justice, education, commerce, &c. The immediate possessions of the Turkish Empire are divided into general governments or vilayets, at the head of each of which is a governor bearing the title of vali. The vilayets are themselves subdivided into sanjaks, administered by mutessarifs; and these again into kazas administered by kaimakams. Military service is obligatory on all Mohammedans.

The service lasts twenty years: nine with the Nizam and first reserve, nine years in the Redif, and two in the Mustafiz (equivalent to the German Landsturm). The strength of the army on a war footing is now very nearly 1,000,000. The navy is of very little account, but a reorganization has taken place in recent years. There are six cruisers of about 3200 tons, some of them new. The other ironclads are obsolete.

Finances.—The financial condition of Turkey is thoroughly unsound. From 1854 the state had contracted a series of foreign loans, the total nominal capital of which amounted to about £228,000,000 in 1877. In 1875 the government announced that they would pay half the interest on the debt, but in 1876 they declared themselves unable to pay anything. In 1881 an arrangement was effected by delegates of the bondholders. The Turkish government then agreed to hand over the excise and other revenues to a commission representing the bondholders, so that interest to the extent of 1 per cent has been paid since 1882, increased to 1½ in 1903. The total capital of the debt at present is £120,000,000, besides internal and floating debt. The revenue was recently estimated at about £18,500,000, the expenditure at somewhat less, but there is generally a deficit.

Religion and Education.—Mohammedanism is professed by the great majority of the population, but half the population of European Turkey are non-Mohammedans. The government recognizes nine non-Mohammedan creeds, namely, Roman Catholics, Greeks, Bulgarians, Armenians, Syrians, Maronites, Protestants, Jews, and Nestorians. The educational system of Turkey provides for the erection of elementary schools in every commune, and of secondary schools in the larger towns. There is nominally a university at Constantinople, besides law, military, and medical schools.

History.—See *Ottoman Empire*.

Turkey, a large gallinaceous bird (*Meleagris gallopavo*), well known as an inmate of our poultry-yards. It is a native of North America, and was introduced into Europe in the 16th century. Wild turkeys abound in some of the forests of America, where they feed on berries, fruits, insects, reptiles, &c., their plumage being a golden bronze, shot with violet and green, and banded with black. On account of its size and the excellence of its flesh and eggs, the turkey is one of the most valued kinds of

poultry. There is another species, the Honduras or West Indian turkey (*Meleagris ocellata*), which derives its specific name from the presence of bright eye-like spots on the tail-coverts. It is not so large as the common turkey, but its plumage is more brilliant.

Turkey-buzzard, or **TURKEY VULTURE**, a rapacious bird belonging to the vulture family (Vulturidae) and the genus *Cathartes* (*C. aura*): so named from its bearing a distant resemblance to a turkey. It is about 2½ feet long, and with wings extended about 6 feet in breadth, general colour black or brownish. It inhabits a vast range of territory in the warmer parts of America.

Turkey-carpet, a carpet made entirely of wool, the loops being larger than those of Brussels carpeting and always cut. The cutting of the yarn gives it the appearance of velvet.

Turkey-red, a brilliant and durable red colour produced by madder (and now by alizarine) upon cotton cloth, and introduced from the East about the end of the 18th century. The processes used in turkey-red dyeing are numerous, and vary in different establishments, but the most essential is the preliminary treatment of the fabric with oils or fats, combined with certain other substances, such as carbonate of potash or soda.

Turkey-stone, a very fine-grained siliceous slate, commonly of a greenish-gray, sometimes of a yellowish or brownish gray colour. When cut and polished it is used for sharpening small cutting instruments.

Turkomans, a nomadic Tartar people occupying a territory stretching between the Caspian Sea and the Sea of Aral, the khanates of Khiva and Bokhara, Afghanistan, and Persia. They do not form a single nation, but are divided into numerous tribes or clans.

Turks, a widely spread race, supposed to have had its original seat in Turkestan, but now extending from European Turkey through Asia to the shores of the Northern Ocean. Besides the Ottoman Turks or Osmanli of Turkey, the Turkomans, Kirghiz, Usbecks, Yakuts, &c., all belong to the Turkish race. See *Turkey, Ottoman Empire, &c.*

Turks Islands, comprising Grand Turk and Salt Cay, belong to the Bahamas, and with the Caicos Islands are a dependency of Jamaica, having a government of their own. Grand Turk is 7 miles long and 2 broad; pop. 1883. Salt Cay is smaller; pop. 485. The chief export is salt. See *Caicos*.

Turmeric, the dried tubers or rhizomes of *Curcuma longa*, natural order Zingiberaceæ (ginger). It is largely employed in India and China as an important ingredient in curry powder. Unsized white paper, steeped in an alcoholic solution of turmeric, when dried, is employed as a test to detect alkalies, which change its colour from yellow to reddish-brown. Turmeric yields a yellow colour, which has great brightness but little durability. It is also used medicinally in the East as a carminative.

Turner, CHARLES TENNYSON. See under *Tennyson*.

Turner, JOSEPH MALLORD WILLIAM, R.A., great English landscape-painter, was born in London 1775, died 1851. His father, who was a hair-dresser, proposed to teach the boy that trade, but afterwards allowed him to follow his inclination, and in 1789 he entered the Royal Academy as a student. After remaining there for five years, and working actively at his profession for other five, during which periods he sent to the exhibition no less than fifty-nine pictures, he was elected in 1799 an associate of the Royal Academy. In the two following years he exhibited fourteen pictures, and in 1802 was elected an academician. Till this date he had chiefly been known as a landscape-painter in water-colours, but thenceforth he turned his attention to oil-painting, and in the ensuing half-century produced at the Academy exhibitions upwards of 200 pictures. In 1807 he was elected professor of perspective in the Royal Academy, and the following year appeared his *Liber Studiorum* or *Book of Studies*, which Charles Turner, Mr. Lupton, and others engraved. Other works by him which were engraved are his illustrations of Lord Byron's and Sir Walter Scott's poems; Roger's *Italy and Poems*; *The Rivers of England*; *the Rivers of France*, and *Scenery of the Southern Coast*. 'The reputation of Turner,' says Mr. R. N. Wornum, 'among landscape-painters stands alone, solitary, colossal; no man has displayed at the same time such great powers of generalizing and concentrating the beauties of nature. For half a century Turner produced a succession of great works, from 1790 to 1840. After this period, he fell, for the most part, into that vague trifling with mere effects of light and shade and colour which has done so much for a time to almost destroy the great reputation he had justly acquired by his previously unrivalled works. He worked

in three styles: the best of his early works resemble Wilson and the Poussins; in his second style Claude was his model; and in his third he competed with nature only. . . . As examples of his three styles may be mentioned the Garden of the Hesperides, the Shipwreck, and the Sun Rising in Mist, illustrating the first; Crossing the Brook, the Morning of the Chase, and Apuleia in Search of Apulsius, his second or Claude style; the Rise, and the Fall of Carthage, 1815 and 1817, showing his transition from this second style to his third and greatest, of which the Bay of Baizæ, Caligula's Bridge, and Childe Harold's Pilgrimage, painted between 1823 and 1832, are grand examples; and lastly, the Fighting Temeraire, painted in 1839, may be instanced as the indication of the point of final transition from the sublime to what we must call the ridiculous in some of those strange productions which occupied the last years of his prolonged life.' By his will he bequeathed all his pictures and sketches to the nation, on condition of a suitable building being erected within ten years for their reception. They have been placed in the Turner Gallery, occupying two rooms in the National Gallery.

Turner, SHARON, was born in London 1768, died 1847. Educated at a private school in Clerkenwell, he was articled to and became an attorney in the Temple, but subsequently devoted his time to historical and philological researches. His chief works are: History of the Anglo-Saxons (three vols., 1799-1805); History of England (nine vols., 1799-1829); Sacred History of the World (three vols., 1832); and Richard Third, a poem (1845).

Turnhout, a town, Belgium, province of Antwerp, 26 miles E.N.E. of the town of Antwerp. It has manufactures of linen, woollen, and cotton fabrics, coloured paper, playing-cards, and various other industries. Pop. 22,800.

Turning, the art of giving circular and other forms to articles of wood, metal, bone, ivory, &c., by making them revolve in various manners in a machine called a *lathe*, and applying cutting instruments so as to produce the form required; or by making the cutting instrument revolve when the substance to be operated upon is fixed. See *Lathe*.

Turnip, the common name of the *Brassica Rapa*, a cruciferous, biennial plant, much cultivated on account of its esculent root, and of the same genus as the cabbage, cauli-

flower, and broccoli. The turnip, as a culinary vegetable and as a cattle food, was well known to the Greeks and Romans, the latter of whom may have introduced it into gardens in Britain, though a wild variety or species (*B. campestris*) is found there. The root is generally used as a culinary vegetable in all temperate climates, and in Britain particularly the vegetable is cultivated on a large scale for feeding stock, the root being invaluable for this purpose. In the field culture of the larger-rooted varieties the most advantageous mode is by drills. The roots of the turnip have often a tendency to divide and become hard and worthless—a condition known as finger-and-toe, or dactylorhiza. The plant thrives best on a rich and free soil and in moist cloudy weather. There are several varieties, all apparently the result of cultivation. The Swedish turnip, which forms a valuable field crop, is probably a hybrid between *B. campestris* and *B. Rapa* or *Napus*, rape. *B. Napus* yields rape, cole, or colza seeds, from which a well-known fixed oil is expressed.

Turnip-fly, TURNIP-FLEA, the *Haltica nemorum*, a small coleopterous insect, very destructive to young turnips. It is common in British meadows from April to October, and



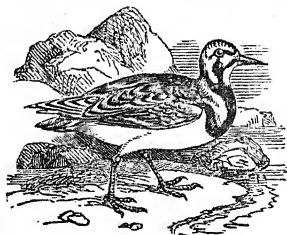
Striped Turnip-fly (*Haltica nemorum*). a, a, Natural size. b, b, Magnified. c, Larva, natural size.

may be recognized by two yellow stripes on its wing-cases. The name *turnip-fly* is also given to a hymenopter, the *Athalia centifolia*. The larvæ of this fly, popularly known as *niggers*, are very destructive to the leaves of the turnip.

Turnpike, a gate that may be set across a road, and is watched by a person appointed for the purpose, in order to stop carriages, carts, wagons, &c., and sometimes travellers, till toll is paid, for the cost and upkeep of the road. Such roads are called turnpike-roads, or simply turnpikes, and formerly were very numerous in Britain, but latterly tolls on roads have been almost entirely abolished. See *Roads*.

Turnspit, a name given to a variety of terrier dogs, from their being trained to turn the spits or roasting-jacks in mansions. The breed is now practically extinct.

Turnstone, a grallatorial bird of the plover family (*Streptilas collaris*). The length of the bird is about 9 inches. It takes its name from its practice of turning



Turnstone (*Streptilas collaris*).

up small stones in search of the marine worms, minute crustaceans, &c., on which it feeds. It appears in most parts of the globe, and occurs in Britain as a winter visitant. There are also several other species.

Turn-table, in railways, a circular platform of iron and wood, supported on rollers, and turning upon a centre without much friction, even when loaded with a considerable weight. It is used for removing single carriages from one line of rails to another, and also for reversing engines on the same line of rails.

Tur'pentine, an oleo-resinous substance flowing naturally or by incision from several species of trees, as from the pine, larch, fir, pistacia, &c. Common turpentine is obtained from the *Pinus sylvestris* or Scotch fir, and some other species of pine. Venice turpentine is yielded by the larch, *Larix europæa*; Strasburg turpentine by *Abies picea* or silver fir; Bordeaux turpentine by *Pinus maritima* or maritime pine; Canadian turpentine, or Canada balsam, by *Abies balsamifera* or balm of Gilead fir; and Chian turpentine by *Pistacia Terebinthus*. All the turpentine dissolves in pure alcohol, and by distillation yield oils, which are termed *spirits of turpentine*. Oil or spirits of turpentine is used in medicine externally as an excellent rubefacient and counter-irritant, and internally as a vermifuge, stimulant, and diuretic. It is also much used in the arts for dissolving resins and oils in making varnishes, and is familiarly called *turps*.

Turpentine-tree, the name given to some species of trees of the genus *Pistacia*, nat. order Anacardiaceæ, which yield turpentine, as the *P. Terebinthus*, the Chian or Cyprus

turpentine tree, *P. lentiscus*, the Mount Atlas mastic or turpentine-tree, &c. See *Pistachio*.

Turpeth, the root of *Convolvulus Turpethum* or *Ipomœa Turpethum*, a plant of Ceylon, Malabar, and Australia, which has a cathartic property. It is sometimes called *vegetable turpeth*, to distinguish it from *mineral turpeth*. See next article.

Turpeth-mineral ($\text{Hg SO}_4, 2 \text{ Hg O}$), a name given to the yellow basic sulphate of mercury. It acts as a powerful emetic, but it is not now used internally. It is a very useful errhine in cases of headache, amaurosis, &c.

Turquoise (tur'kis), a greenish-blue opaque precious stone, consisting essentially of a phosphate of alumina, containing a little oxide of iron and oxide of copper. The true or oriental turquoise, a favourite ornamental stone in rings and other articles of jewelry, is only found in a mountain region of Persia, and was originally brought into Western Europe by way of Turkey (hence the name).

Turret, in architecture, a kind of small tower. Turrets are chiefly of two kinds, such as rise immediately from the ground, as staircase turrets, and such as are formed on the upper part of a building by being carried up higher than the rest.

Turret-ship. See *Ironclad Vessels*.

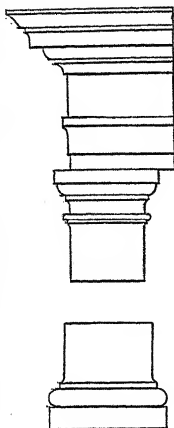
Turtle, the name given to the marine members of the order Chelonia, being reptiles which differ but little from tortoises, the name turtle or tortoise being in some cases applied indifferently. They are found in all the seas of warm climates, and feed mostly on marine plants. The most important species is the green turtle (*Chelonia mydas*), which is from 6 to 7 feet long, and weighs from 700 to 800 pounds. Its flesh is highly esteemed as a table luxury. It is a native of the tropical parts of the Atlantic as well as of the Indian Ocean, being especially abundant near Ascension Island. The logger-head turtle (*Chelone* or *Chelonia caretta*) yields an oil, which is used for lamps and for dressing leather. The hawk's-bill turtle (*C. imbricata*) is remarkable for the beautiful imbricated horny plates covering the carapace, and constituting the tortoise-shell of commerce. See *Tortoise*.

Turtle-dove (*Turtur communis*), a small variety of pigeon, about 11 inches in length, colour pale brown marked with a darker hue above, a purple tinge pervading the feathers of the breast. They are in general smaller

and more slender than the domesticated pigeons, and their cooing note is plaintive and tender. Turtle-doves are found throughout the temperate parts of Europe and Asia, and in Britain they arrive for the summer months.

Tuscan Order of Architecture, one of the five orders of architecture, according to Vitruvius and Palladio. It admits of no ornaments, and the columns are never fluted. Otherwise it differs so little, however, from the Doric, that it is generally regarded as being only a variety of the latter. See *Doric*.

Tuscany (Italian, *Toscana*), formerly a grand-duchy, now a department of Italy; area, 9289 square miles; pop. 2,548,154. The chain of the Northern Apennines forms a considerable portion of its northern boundary, the sea being its boundary on the west. The principal river is the Arno. Cereals cover a large area, and vineyards, olive-yards, and orchards are numerous. The manufacture of silk is considerable. The marble of Tuscany, especially that of Siena, is well known. Tuscany corresponds to the ancient Etruria, which was, however, of wider extent. (See *Etruria*.) After the fall of the Western Empire (476) it passed successively into the hands of the Ostrogoths, Byzantine Greeks, and Lombards. Charlemagne made it a Frankish province, and it was governed by marquises or dukes until the 12th and 13th centuries, when it became broken up into a number of small republics, four of which were Florence, Pisa, Siena, and Lucca. From the first Florence occupied the leading place, and it gradually extended its territory. In 1569 Pope Pius I. granted to Cosmo I. the title of Grand-duke of Tuscany, and this position was retained, with interruptions, by the Medici family (which see) until 1737, when it passed to Francis Stephen, duke of Lorraine. In 1859, when under his descendant, the grand-duke Leopold, it was annexed to Sardinia by a popular vote, and in 1861 became, with Sardinia, part of the kingdom of Italy.



Tuscan Order.

Tusculum, an ancient Latin city, now in ruins, near the site of the modern Frascati, 15 miles S.E. of Rome. It was the birth-place of the elder Cato, and a favourite residence of Cicero. Among the remains are the so-called Villa of Cicero, the Forum, theatre, amphitheatre, and ancient castle or citadel.

Tussar-silk, or **TUSSEH-SILK**, a coarse silk obtained from the cocoons of a wild native Bengal silk-worm. See *Silk*.

Tussila'go, colt's-foot, a genus of broad-leaved plants, nat. order Compositæ, sub-order Corymbifera. The species are natives of Europe and America. *T. Farfara* (common colt's-foot) is a native of Britain. See *Colt's-foot*.

Tussock-grass (*Dactylis cæspitosa*), a large grass, of the same genus with the cock's-foot grass of Britain, a native of the Falkland Islands, Fuegia, and South Patagonia. It grows in great tufts or tussocks sometimes 5 or 6 feet in height, the long tapering leaves hanging over in graceful curves. The plant is a useful food for cattle, and several attempts have been made to establish it in Scotland.

Tu'tenag, Chinese white copper, an alloy of copper 50, nickel 19, and zinc 31, used for table ware, &c. A small quantity of lead or iron is added in some formulas. It much resembles packfong, which is also called Chinese white copper.

Tuticorin', a seaport of India, a terminus of the South Indian Railway, 33 miles east of Tinnevely, Madras. The roadstead is good, and the trade considerable. Pop. 28,048.

Tutor, (1) in English universities, the name given to scholars attached to the various colleges, by whom, assisted by private tutors, the education of the students is chiefly conducted. They are selected from the fellows. (2) In Scots law, the guardian of a boy or girl in pupilarity. By common law a father is tutor to his children. Failing him there may be three kinds of tutor, a *tutor-nominate*, a *tutor-at-law*, or a *tutor-dative*.

Tuttlingen, a town of Würtemberg, on the Danube, near the Baden frontier, with various manufactures. Pop. 13,530.

Tutuila, one of the Samoan Islands, belonging to the U. States since 1900. It rises to about 2300 feet, is covered with vegetation, and has a good harbour. Area, 54 square miles. Pop. about 4000.

Tuyere. See *Blast-furnace*.

Tver, a town, Russia, capital of the government of the same name, situated in a plain on the Volga, 96 miles north-west of Moscow. It consists of the Kremlin or fortress, surrounded by an earthen wall, and the town proper. The manufactures are numerous and varied. Pop. 53,477.—The government of Tver has an area of 25,225 square miles, and a population of 1,769,135. Rye, barley, hemp, and flax are largely cultivated, and the forests are extensive.

Twain, MARK. See *Clemens*.

Twat, an oasis group in the Sahara, south-east of Morocco, to which it is considered as belonging. The inhabitants are about 300,000 in number, partly Arabs, partly Berbers, and are fanatical Mohammedans.

Tweed, a river of Scotland, which rises in the south part of Peeblesshire, passes by or near to Peebles, Melrose, Kelso, Coldstream, from near which place it forms the boundary line between England and Scotland for 16 miles, runs through England for a short distance, and then enters the North Sea at Berwick; total length, 97 miles. Its tributaries include the Etrick, Gala, Leader, Teviot, Eden, and Till. Its waters abound with salmon and trout, and its name is celebrated in connection with some of the best literature of Scotland.

Tweeds, a twilled fabric, principally for men's wear, having an unfinished surface, and two colours generally combined in the same yarn. The best quality is made all of wool, but in inferior kinds cotton, &c., are introduced. The manufacture is largely carried on in the south of Scotland.

Twelfth-day, the twelfth day after Christmas, upon which is held the festival of Epiphany (which see). On the evening of this day, called Twelfth-night, various social rites and ceremonies are observed in different countries. One of these is the baking of a twelfth-cake, into which a bean is introduced. When the cake is divided at the feast the person who receives the piece containing the bean is made king for the occasion.

Twenty-four Parganas, THE, a district in the presidency of Bengal; area, 2097 sq. miles. The sea-board consists of swamps, which are known as the Sundarbans. The civil head-quarters are at Alipoor, a suburb of Calcutta. Pop. (exclusive of Calcutta), 2,078,340.

Twickenham, a town in Middlesex, on 339

the Thames, nearly 11 miles s.w. of London, and connected with Richmond by a bridge. In the 18th century it was a fashionable resort, and the residence of Pope, Horace Walpole, and other notables. Pop. 20,991.

Twig-rush. See *Cladium*.

Twilight, daylight which continues after sunset, occasioned by the reflection of sunlight from the higher parts of the atmosphere which are still illuminated after the sun has become invisible from ordinary heights. It is supposed to last till the sun is about 18° below the horizon, but is much influenced by the state of the atmosphere as to clouds, &c. In low latitudes (that is, near the equator) there is little twilight.

Twill, a textile fabric, in which the weft threads do not pass over and under the warp-threads in regular succession, as in common plain weaving, but pass over one and under two, over one and under three, or over one and under eight or ten, according to the kind of twill.

Twiss, SIR TRAVERS, Q.C., born in Westminster 1810; educated at University College, Oxford; became a fellow and tutor in his college; was appointed successively professor of political economy at Oxford (1842-49); professor of international law, King's College, London (1852-55); professor of civil law in Oxford (1855-70); and advocate-general of the crown (1867-72). His chief works are: *The Oregon Question Examined* (1846), *View of the Progress of Political Economy in Europe* (1847), *The Letters Apostolic of Pope Pius IX.* (1851), *Lectures on the Science of International Law* (1856), *The Law of Nations (The Rights and Duties of Nations in Time of War, The Rights and Duties of Nations in Time of Peace; 1861-63), and Belligerent Right on the High Seas* (1884). He died in 1897.

Tyburn, a turnpike at the west end of Oxford Street, London, noted for the public executions of metropolitan malefactors which long took place near it. The turnpike was removed in 1829.

Tyco Brahe. See *Brahe*.

Tycoon. See *Shogun*.

Tyldesley, a town of England, in Lancashire, about 10 miles n.w. of Manchester. Its chief industries are cotton-spinning and coal-mining. Pop. 14,843.

Tyler, JOHN, tenth president of the U. States, born 1790, died 1862. He entered congress as a republican in 1816, and in 1840 was vice-president under the presidency of General Harrison. On Harrison's

death in 1841 he became president, and came into collision with his party on the National Bank Bill and other questions. The annexation of Texas was the chief event of his term of office, at the end of which he retired into private life. On the outbreak of the Secession war he espoused the cause of the South, and was a member of the Confederate congress.

Tyler, WAT, an English soldier who had served in the French wars, and one of the leaders in the rebellion of 1381 against the poll-tax (which see). He led the men of Kent upon London, where, after fire and pillage, they were partly dispersed by a promise of the king to grant them charters of freedom and amnesty. Tyler, however, remained with a body of the insurgents, and was met by the king next day at Smithfield, where, for his apparent insolence in the royal presence, he was stabbed by William Walworth, mayor of London.

Tylor, EDWARD BURNETT, D.C.L., LL.D., F.R.S., anthropologist, born at Camberwell 1832. He has devoted himself with much success to researches in the history of man and civilization; is president of the Anthropological Society, keeper of the Oxford University Museum, and reader in anthropology. He was appointed first Gifford lecturer at Aberdeen in 1888. His chief works are: *Researches into the Early History of Mankind*; *Primitive Culture*; *Anthropology*, an *Introduction to the Study of Man and Civilization*; &c.

Tym'panum, (1) a cavity of an irregular shape situated in the ear. (See *Ear*.) (2) In architecture, the triangular space in a pediment included between the cornices of the inclined sides and the horizontal cornice; also, any similar space, as above a window, or the space included between the lintel of a door and the arch above it. The tympanum is often ornamented with carving or sculpture.

Tyndale, WILLIAM. See *Tindall*, *William*.

Tyndall, JOHN, physicist, born in 1820 at Leighlin Bridge, Carlow, Ireland; educated in a neighbouring school; joined the Irish Ordnance Survey in 1839; engaged in railway engineering for several years; was appointed teacher in Queenwood College, Hants; went abroad, where he studied under Bunsen in Marburg University and Magnus in Berlin; was elected to the chair of natural philosophy in the Royal Institution in 1853; visited Switzerland in 1856 along with

Huxley, and made repeated investigations in that country subsequently; lectured throughout the United States in 1872; presided over the British Association in 1874 at Belfast; and was for several years adviser on lighthouses to the Board of Trade. He died in 1893. He was D.C.L., LL.D., and F.R.S. His chief works are: *The Glaciers of the Alps* (1860); *Mountain-eering in 1861* (1862); *Heat Considered as a Mode of Motion* (1863); *On Radiation* (1865); *Sound* (1865); *Faraday as a Discoverer* (1868); *Light* (1870); *Researches on Diamagnetism and Magne-Crystalline Action* (1870); *Hours of Exercise in the Alps* (1871); *The Forms of Water in Clouds, Rivers, Ice, and Glaciers* (1872); *Fragments of Science* (1876); *Fermentation* (1877); *Floating Matter in the Air in Relation to Putrefaction and Infection* (1881).

Tyne, THE, a river of England, formed by the junction near Hexham of the North Tyne, which rises in the Cheviots, on the borders of Roxburgh, and the South Tyne, which rises at Tynehead Fell, in the extreme east of Cumberland. The united stream divides the counties of Durham and Northumberland, passes the ports of Newcastle, Jarrow, North and South Shields, and enters the sea at Tynemouth after a course from Hexham of nearly 30 miles. The Tyne has, since 1854, been the subject of large engineering operations, consisting of extensive dredging, the construction of piers at its mouth, the formation of large docks, and the building of a swing-bridge at Newcastle. Thus from the sea to Scotswood suspension-bridge, a distance of about 10 miles, the river is now navigable for large vessels, and the trade on the river, chiefly in coal, has been immensely increased. See *Newcastle-on-Tyne*.

Tynemouth, a parliamentary and municipal borough, England, county of Northumberland, at the mouth of the Tyne on its north bank. There are many handsome buildings, a parade nearly a mile long, the ruins of a picturesque old priory, an aquarium, winter-garden, baths, &c., and the place is much frequented for sea-bathing. The port of North Shields and several villages are included within the borough, which returns one member to parliament. Pop. mun. and parl. bor., 51,866.

Type, a rectangular solid of metal, wood, or other hard material having a raised letter, figure, punctuation mark, or other character on the upper end, which, when inked, is

TYPE-WRITER—TYPHOID FEVER.

used to make impressions on paper and other smooth surfaces; the term is also used collectively. Types must be all of a uniform height, and perfectly true in their angles, otherwise they could not be locked firmly together to be printed from. The nicks *d d d* shown in figure are notches made on one side of the type to assist the compositor in distinguishing the bottom from the top; the *groove (e)* is a channel made in the bottom of the type to make it stand steadily. From the character of the letters types are known as CAPITALS, small or lower-case letters, *italics*, script, &c. From their size they receive the following names, from *brilliant*, which, however, is rarely used, to *English*, the largest used in ordinary book-work:—



Brilliant....	William Caxton was the first English Printer.
Diamond....	William Caxton was the first English Printer.
Pearl.....	William Caxton was the first English P
Ruby.....	William Caxton was the first English
Nonpareil..	William Caxton was the first En
Minion....	William Caxton was the first
Brevier....	William Caxton was the first
Bourgeois..	William Caxton was the first
Longprimer	William Caxton was the first
Small Pica.	William Caxton was the first
Pica.....	William Caxton was the first
English....	William Caxton was the first
Brevier..	Black Letter or Old English

Types are made by casting (which is now done by machinery), the letter being first cut upon the end of a steel punch, and the punch then driven into a piece of copper, which forms the *matrix* or bottom of the mould intended to produce the letter. Type-metal is an alloy of lead, antimony, and tin. See *Printing*.

Type-writer, a machine intended to be used as a substitute for the pen, and by which the letters are produced by the impression of inked types with far greater rapidity than by the pen. The first practically successful type-writer was patented in America in 1867, and most of those introduced since are American. The essential elements in such machines are a movement to bring the type into position, an inking device, an impression movement, and means for letter and line spacing. Commonly there are a number of letter keys arranged

in rows, to be worked by the fingers of both hands, a letter being imprinted on the paper (which moves automatically) each time a key is struck. There may be a series of type-levers, each with a single character, or the types (characters) may be on a wheel or cylinder. The type-levers may also each have two or three characters. In one machine, for instance, there are only two rows of keys, numbering twenty-nine in all. Each key works a lever to which is attached a capital letter, an ordinary Roman letter, and a figure. The capital letters and the figures are brought into play by means of two small 'shift stops', and the printing as it is performed is in full view of the operator.

Typha'cee, a natural order of monocotyledonous plants, characterized by their calyx being three-sepaled and half-glumaceous, or a mere bundle of long hairs, by their long lax filaments, clavate anthers, solitary pendulous ovules, and peculiar habit. The order includes two genera, *Typha* and *Sparganium*, the species of which are abundant in the northern parts of the world. They are herbaceous reed-like plants, growing in marshes and ditches. See *Reed-mace*.

Typhline, a curious lizard belonging to a family in which the eyes and ears are hidden under the skin. In the typical species, the common typhline (or blind acontias—*Typhlina Cuvieri*), the limbs are entirely wanting, and the animal looks utterly helpless, having no apparent legs, feet, eyes, or ears. It is a native of South Africa.

Typhoid Fever, called also enteric fever and gastric fever, a disease somewhat resembling typhus, but essentially different. It is characterized by serious disorder of the bowels, and is not infectious in the sense that it can be communicated from one person to another by breath or by the skin, as in scarlet fever and small-pox. The poison seems to consist of living organisms or disease germs which exist in the discharges from typhoid fever patients, may gain admission to the water of wells, and hence to the human stomach, perhaps by the water being used to wash milk dishes. When these germs gain access to the alimentary canal of a person whose general health is impaired, the disease is usually set up. It is uncertain what time may elapse between the introduction of the poison and the appearance of the disease, but the period is usually about three weeks. The symptoms of the disease are languor, chills, violent headache, thirst, and pains in the limbs. Soon diarrhoea sets in,

accompanied by a distended and tender state of the abdomen. The temperature rises, the skin loses its moisture, the kidneys cease to act freely, and the tongue becomes dry and brown. Then a rose-coloured rash appears over the chest and abdomen, which may soon disappear, only, however, to be followed by a new crop of spots. At this stage delirium and other serious symptoms arise, and as the disease advances ulceration or perforation of the bowels may take place. While the symptoms here described are those of a typical case, there are numerous instances where the patient may have no marked looseness of the bowels, no spots on the skin, and no delirium. In the treatment of the disease the most important thing is the dieting. Only soft liquid foods are allowable, such as milk, in abundance, boiled bread and milk, corn-flour, &c. Looseness of the bowels, if excessive, should be checked by catechu and chalk mixture, with the addition of landanum, if necessary, to a grown-up person. The disease, even in a mild form, is sufficiently serious, and it often proves fatal.

Typhon, the Greek designation of an Egyptian deity called Set or Seth, son of Seb, and brother to Osiris, whom he is said to have destroyed. He seems to have represented the volcanic forces of the earth.

Typhoon, a violent hurricane, especially one of those which rage on the coasts of China and Japan and the neighbouring archipelago, occurring from May to November, being most frequent and disastrous in July, August, and September.

Typhus Fever, known also as hospital fever, jail fever, &c., is essentially a fever of the poor, ill-fed, and badly-housed inhabitants of large cities. It is infectious, and the infection seems to be carried in the breath of the patient. For this reason free ventilation is the least favourable condition for the spread of typhus. Before the symptoms show themselves a period of from five to twelve days may pass after the person is infected. Then there is generally a shivering, followed by a hot, dry skin, a suffused condition of the eyes, a small pupil, thirst, a dull, stupid expression, great prostration, and costive bowels. About the seventh day a rash of irregular spots and of a dusky hue appears over the chest and back, but sometimes this is entirely absent. As the disease advances the patient's strength becomes exhausted; the urinary secretion is scanty, if not entirely suppressed, delirium sets in,

and the disease is often complicated by bronchitis, pneumonia, or pleurisy. About the fourteenth day, in favourable cases, the turn of the fever is shown by the patient falling into a sound sleep, from which he awakes with the fever gone. In unfavourable cases the prostration increases, the feverishness is heightened, convulsions may occur, and at length the patient sinks into unconsciousness. The treatment consists in keeping the patient in a well-ventilated room, and preventing exhaustion by a light and wholesome diet. Milk, beef-tea, nourishing soups without vegetables, should be given to the patient in small quantities at short intervals.

Typography. See *Printing*.

Tyr, in northern mythology, the son of Odin, brother of Balder, and the god of war and victory. He corresponds to the Anglo-Saxon Tiw, from whom Tuesday is named, and the day is similarly named among the Danes and Icelanders.

Tyrannus, a genus of insessorial birds. The best-known species is the tyrant fly-catcher (*T. carolinensis*), which is remarkable for its bold and pugnacious disposition. It is a native of the U. States, feeds on insects, and is not afraid to attack birds of prey much larger than itself. It is also called *tyrant-shrike* and *king-bird*.

Tyrant, originally, in ancient Greece, one who had usurped the ruling power without the consent of the people or at the expense of the existing government. Such a ruler, although he obtained his power illegally, did not always use it oppressively and violently; on the contrary, it was frequently used humanely and beneficently, and some tyrants were patrons of literature and art.

Tyrant Fly-catcher. See *Tyrannus*.

Tyre, one of the most celebrated cities of ancient Phœnicia, and with its elder sister, Sidon, long a great trading mart. It was built partly on an island and partly on the mainland; and the insular fortifications formed its chief strength when besieged and taken by Alexander the Great in B.C. 332. A mole or causeway then constructed to the island was the origin of the isthmus which now connects it with the mainland. Tyre was famous in the 10th century B.C. under Hiram the friend of Solomon, was besieged in vain by the Assyrians in 725-720 B.C., and by Nebuchadnezzar 585-572 B.C., and remained an important place till it came into the hands of the Turks. It was famous for a dye (the Tyrian purple) obtained from the

TYROL—UBERWEG.

shell-fish *Murex* (which see). The modern Tyre or Sur is a place of 6000 inhabitants (3000 Christians). See also *Phœnicia*.

Tyrol', or **Tirol'**, a province of Austria (including Tyrol proper and Vorarlberg), is bounded north by Bavaria and Lake Constance, west by Switzerland, east by Salzburg and Illyria, south, east, and west by Venetia and Lombardy; area, 11,325 square miles. In magnificence of scenery Tyrol is only inferior to Switzerland, of which it is a continuation. The Alps enter it from Switzerland in three chains, of which the central (the Tyrol or Oetzthaler Alps) is the loftiest, and divides the country into North and South Tyrol. The drainage of North Tyrol is mainly carried to the Danube by the Inn, which is the only navigable river; that of South Tyrol is mostly conveyed to the Adriatic by the Adige. About one-third of the surface is practically inaccessible, another third is occupied by forests. The vine and cereals are cultivated, and minerals, especially iron and salt, are extensively worked. Silk, metal wares, wood articles, lace, and embroidery, are among the manufactures. The capital is Innsbruck. Pop. 852,712.

Tyrone, a county of Ireland, in the province of Ulster; bounded by Londonderry, Donegal, Armagh, Monaghan, and Fermanagh; area, 806,658 acres. The surface is hilly, rising into mountains in the north and south, and declining to a level towards Lough Neagh. The soil in the lower districts is fertile, and the county is watered by numerous branches of the Foyle and Blackwater. Agriculture generally is in a backward state. Coal is raised to a small extent near Dungannon in the eastern portion of the county; linens, woollens, earthenware, whisky, beer, chemicals, &c., are made. Since 1885 the county returns four members to parliament. Principal towns, Stra-

bane, Dungannon, Cookstown, and Omagh. Pop. 150,567.

Tyrrhenian Sea, the name given to the part of the Mediterranean Sea adjoining the south-west coast of Italy, and extending to Corsica, Sardinia, and Sicily.

Tyrtæus, a Greek lyric poet of the 7th century B.C., a native of Attica, celebrated for his war songs written for the Spartans.

Tyrwhitt, **THOMAS**, born in London 1730, died 1786. He was educated at Eton and at Queen's College, Oxford; became a fellow of Merton; clerk to the House of Commons (1761-67); and in 1784 was appointed a curator of the British Museum. Among his writings were: *Observations on some Passages of Shakspeare* (1766); an edition of Chaucer (1775); and an edition of the so-called Rowley's Poems, in the appendix of which he exposes the fraud of Chatterton.

Tytler, **PATRICK FRASER**, fourth son of Alexander Fraser Tytler (Lord Woodhouselee), was born at Edinburgh in 1791, and died in 1849. He was educated at the High School and the University of Edinburgh, and in 1813 was admitted a member of the Faculty of Advocates. He abandoned the bar, however, for literature, and wrote his great work, the *History of Scotland*, 1823-43. Among his other works are his biographies of the Admirable Crichton, Wicklyff, and Sir Walter Raleigh.—His father, **ALEXANDER FRASER TYTLER** (Lord Woodhouselee), Scotch judge, born at Edinburgh 1747, died 1813. His chief work is the *Elements of General History*. He also contributed papers to *The Mirror*, *The Lounger*, &c.—Lord Woodhouselee's father, **WILLIAM TYTLER**, of Woodhouselee, born 1711, died 1792, published an *Inquiry into the Evidence Against Mary Queen of Scots*, *Criticisms of Hume's and Robertson's Histories*, the *Poetical Remains of James the First*, &c.

U.

U, the twenty-first letter and the fifth vowel in the English alphabet. Its true primary sound was that which it still retains in most of the languages in Europe, that of *oo* in *cool*, *tool*, *good*, *wood*, &c., answering to the French *ou* in *tour*, the sound being sometimes short, sometimes long.

Ubangi. See *Mobangi*.

U'beda, a city, Spain, province of Jaen,

on the right bank of the Guadalquivir. It contains a fine cathedral. Pop. 18,149.

Uberweg (ü'ber-väh), **FRIEDRICH**, born in Rhenish Prussia 1826, died 1871. He studied at Göttingen and Berlin, and in 1862 was appointed professor of philosophy at Königsberg. He wrote *A System and History of Logic* (1857), and *A History of Philosophy*, both translated into English.

Ubes, St. See *Setubal*.

Ucayale, or UCAYALI, a large river of Peru, one of the head-waters of the Amazon. It begins in the Apurimac, is upwards of 1000 miles in length, and is navigable by large vessels for 100 miles.

Udaipur, or OODEYPORE, a town in the north-west of India, capital of a native state of the same name in Rajputana, on a lake 2000 feet above sea-level, contains a notable royal palace, and exports cotton, indigo, &c. Pop. 45,976.—The state (called also *Meywar*), area 12,670 sq. miles, came under the protection of Britain in 1817, and the rajah ranks highest in dignity among the Rajput chiefs. Pop. 1,021,664.

Udal. See *Odal Right*, and *Allodium*.

Udall, NICHOLAS, the author of *Ralph Roister Doister*, the first regular English comedy, born 1506, died 1556. He was master of Eton School from 1534 to 1541, and the play was written for performance by the scholars. Its authorship was not ascertained till 1818. He was in favour at court as a writer of pageants and interludes.

Uddevalla, a seaport in the south-west of Sweden, at the inner end of the Byfjord. Pop. 11,800.

Udine (ŭ'di-nā), a walled town of North Italy, capital of a province of same name and see of an archbishop, 60 miles north-east of Venice. It contains a castle (now a barrack), a Romanesque cathedral, bishop's palace, &c., and has manufactures of linen, silk, woollens, &c. Pop. 37,933; of prov. 594,334.

Ufa, a government of Russia, separated in 1865 from Orenburg; area, 47,112 square miles. On the east, where it is bordered by the Southern Urals, the country is mountainous, wooded, provided with excellent pastures, and rich in minerals. It is also well watered by the Bielaya, and has abundance of arable land on which good crops are raised. Pop. 2,220,497.—**UFA**, the capital, stands on the Bielaya, at the confluence of the Ufa, 735 miles east by north of Moscow. It is the see of a bishop, and has considerable manufactures and trade. Pop. 49,961.

Uffizi Gallery. See *Florence*.

Ugan'da, a country of British East Africa, to the n.w. of the Victoria Nyanza. It is a rich agricultural country with a mild and uniform climate, and the inhabitants are of a comparatively high type. It was first visited by Speke and Grant in 1860, and is the seat of several mission stations. Under

King Mwanga the Christians were persecuted; and Bishop Hamington was put to death; but the country is now making rapid progress under British protection. Pop. 4,000,000. See *East Africa (British)*.

U'grians, a term applied to the Finnic group of Turanian peoples, comprising the Lapps, Finns, and Magyars or Hungarians, the term Ugrian being applied also to their languages.

Uhland (ŭ'lānt), JOHANN LUDWIG, German poet, born at Tübingen in 1787, died 1862. He studied at Tübingen University; practised law in Stuttgart; was elected a member of the Württemberg Assembly in 1819, and as a politician was ever an advocate of liberal opinions. He was professor of German literature at Tübingen in 1829-32, and latterly lived in studious retirement at Tübingen. His European fame rests upon his lyrics and ballads, though he also wrote dramas, &c.

Uhans (ŭ'lānz), a species of light cavalry in the armies of the Austrians, Russians, and Germans.

Uintah (or UINTA) Mountains, a range of lofty mountains in Utah, U.S., which extend e. from the Wahsatch range, and occupy a large area. Some of the peaks reach an altitude of over 13,000 feet.

Uist (wist), NORTH, an island of the Outer Hebrides, 17 miles long, and from 3 to 13 miles broad, separated from Harris by the Sound of Harris. The surface is chiefly flat, the coast greatly broken by inlets from the sea, and the principal industry is fishing. Pop. 2936.—**SOUTH UIST**, separated from the foregoing by the island of Benbecula, is 22 miles in length and 7 miles in breadth. The surface is low-lying in the north, but the remainder is mountainous. Pop. 3541.

Ujein (ŭ-jān'), a town of India, in Scindia's Dominion, 350 miles north-west of Bombay surrounded by a stone wall with round towers. Pop. 39,892.

Ujiji (u-jē'jē), a town of Equatorial Africa, on the n.e. shore of Lake Tanganyika, in German East Africa, forming a halting-place for caravans from the coast. It was here that Stanley first met Dr. Livingstone. Pop. 8000.

U'kase, a Russian edict or order, legislative or administrative, emanating from the government. Ukases have the force of laws till they are annulled by subsequent decisions.

Ukraine, an extensive country formerly on the frontier between Poland and Russia,

now forming the Russian governments of Kief, Chernigof, Podolsk, Kharkof and Poltava.

Ulns. See *Uhlans*.

Ulcer, a sore in any of the soft parts of the body, either open to the surface or to some natural cavity, and attended with a secretion of pus or some kind of discharge. Ulcers are of various kinds, as *scorbutic*, *cancerous*, *scrofulous*, &c.

Uleåborg (ô'le-o-borg), a town of Russia, in the Grand-duchy of Finland, at the mouth of the Uleå, in the Gulf of Bothnia. Pop. 15,626.

Ule'mas, the hierarchical corporation of learned men in Turkey, composed of the Imams or ministers of religion, the Muftis or doctors of law, and the Cadis or administrators of justice.

Ul'filas, **ULPHILAS**, or **WULFILAS**, a bishop of the Goths of Mœsia, was born, it is supposed, in 311; consecrated bishop by Eusebius of Nicomedia, probably at Antioch, in 341; and died at Constantinople in 381. He translated most of the Bible into Gothic (Mœso-Gothic), employing the Greek of the Septuagint for the Old Testament, and a Greek text, different from the received text, for the New. Only some fragments of this translation have been preserved, including the greater part of the four gospels, and these are of the highest linguistic value. See *Goths*.

Ullswater, or **ULLES-WATER**, a lake in England, between the counties of Cumberland and Westmoreland, about $7\frac{1}{2}$ miles long, and varying in breadth from $\frac{1}{4}$ mile to $\frac{3}{4}$ of a mile; depth 210 feet.

Ulm (ûlm), a strongly fortified town of Württemberg, 45 miles s.s.e. of Stuttgart, on the left bank of the Danube, on both sides of which there are important fortifications. It is an old town, irregularly built, with narrow winding streets, and has a cathedral in the old Gothic style, one of the largest churches in Germany with the tallest spire in the world (530 feet—completed in 1890). Its manufactures include machinery, woollen and linen cloth, leather, paper, brassware, &c. The capitulation of Ulm in 1805 was the turning-point of the campaign of Austerlitz. Pop. 51,680.

Ulma'cœæ, a natural order of exogens, of which the genus *Ulmus* or elm is the type. It is nearly related to *Urticacœæ* (the nettles), from which it differs only in having a two-celled fruit and hermaphrodite flowers. It consists of trees or shrubs, which have

scabrous, alternate, simple, deciduous leaves and fugacious stipules.

Ulna. See *Arm*.

Ulphilas. See *Ulfilas*.

Ulrici (ul-ré'tsè), **HERMANN**, a German philosopher, born 1806, died 1884. Having studied at Halle and Berlin, in 1834 he was appointed professor of philosophy at Halle University. His principal works are: *A History of Greek Poetry* (1835), *Shakspeare's Dramatic Art* (1839), *The Fundamental Principle of Philosophy* (1845-46), *Compendium of Logic* (1860), *God and Nature* (1862), *Body and Soul* (1866), *Elements of Practical Philosophy* (1873).

Ulster, the most northerly of the four provinces of Ireland, comprehending the counties of Antrim, Armagh, Cavan, Donegal, Down, Fermanagh, Londonderry, Monaghan, and Tyrone. Area, 5,483,201 acres, or 8568 square miles. Pop. (1901), 1,581,351.

Ulster King of Arms, the principal herald of Ireland, and of the order of St. Patrick. This office was created in 1552.

Ultima'tum, any final proposal or statement of conditions; especially, in diplomatic negotiations, the final terms of the one party, the rejection of which often involves an immediate rupture of diplomatic relations and a declaration of war.

Ultramarine', a beautiful and durable sky-blue pigment, a colour formed of the mineral called lapis lazuli. This substance is much valued by painters, on account of the beauty and permanence of its colour, both for oil and water painting. Artificial ultramarine is prepared by heating sulphide of sodium with a mixture of silicic acid and alumina.

Ultramon'tanism, the views of that party in the Church of Rome who place an absolute authority in matters of faith and discipline in the hands of the pope, in opposition to the views of the party who would place the national churches, such as the Gallican, in partial independence of the Roman curia, and make the pope subordinate to the statutes of an œcumenical council. According to ultramontanism the pope is superior to general councils, independent of their decrees, and considered to be the source of all jurisdiction in the church. The Vatican Council of 1870 virtually established the views of ultramontanism as dogmas of the church.

Ul'verston, a seaport of England, in Lancashire, about $1\frac{1}{2}$ mile from Morecambe Bay, to which there is a canal. It has a

paper-mill, shoe-factory, blast-furnaces, &c., and there is a small amount of shipping. Pop. 10,064.

Ulysses (ŭ-lis'sēz; in Greek, *Odysseus*), king of the island of Ithaca, was one of the Greek heroes who engaged in the war against Troy. In returning to his own country after the siege he visited the country of the Loto-phagi in N. Africa, the Cyclopes in Sicily (see *Polyphemus*), the island of Æolus king of the winds, reached the island Ætæa, where Circe changed (temporarily) his companions into pigs; visited the infernal regions, where he consulted the soothsayer Tiresias how to return to his country; passed in safety the coast of the Sirens, and the dangers of Scylla and Charybdis; remained for seven years with the nymph Calypso after losing all his men; and at last, after an absence of twenty years, returned to Ithaca. Here he found his palace occupied and his substance wasted by suitors for the hand of his wife Penelope, but with the aid of his son Telemachus he put them to death. He lived about sixteen years after his return. These adventures of Ulysses are the subject of Homer's *Odyssey*.

Umballa. See *Ambala*.

Umbel, in botany, a variety of inflorescence which consists of a number of pedicels or flower-stalks, nearly equal in length, springing from a common centre, with the blossoms on their summits forming a level or rounded surface. When a number of such umbels are aggregated together in the same way we have a *compound umbel*, the smaller umbels being called *partial umbels*.

Umbelliferae, an extensive and impor-



Umbels of Hemlock.

tant natural order of plants, the flowers of which are almost always in regular com-

pound umbels. The plants of this order are natives chiefly of the northern parts of the northern hemisphere, and nearly all herbs with fistular furrowed stems and divided leaves; the fruit consists of two indehiscent ridged carpels united by a commissure. Some are very poisonous, as hemlock and certain others; others are esculents, as celery, carrots, and parsnips; many yield aromatics, as caraway, coriander, dill, anise; a few secrete a fetid gum-resin, much used in medicine, as asafetida, galbanum, opopanax, and sagapenum.

Umber, a well-known mineral pigment, of an olive-brown colour in its raw state, but much redder when burnt. It occurs either naturally in veins and beds, or is prepared artificially from various admixtures. The commercial varieties are known as Turkey umber, raw and burnt, and English umber, the latter being an artificial ochrey admixture.

Umbilicus. See *Navel* and *Placenta*.

Umbra, in astronomy, a term applied to the total shadow of the earth or moon in an eclipse, or to the dark cone projected from a planet or satellite on the side opposite to the sun. See *Penumbra*, *Eclipse*.

Umbrella, a portable shade, screen, or canopy which opens and folds, carried in the hand for sheltering the person. The umbrella had its origin in the East in very remote times, where it was (and still is) regarded as an emblem of royalty or a mark of distinction; but as a defence from rain it was not used in England till early in the 18th century.

Umbrella-bird, a South American bird (*Cephalopterus ornatus*) allied to the crows, remarkable for the crest of blue-black feathers rising from the head and curving towards the end of the beak, which it nearly reaches. Another long tuft of feathers hangs down from the breast.

Umbrella-tree, a name given to two species of *Magnolia*, *M. Umbrella* and *M. tripetala*, from the form and position of the leaves. The same name is given to *Pandanus odoratissimus*, the screw-pine.

Umbria, a division of Italy, on the Adriatic, which derives its appellation from the Umbrians, by whom it was inhabited in ancient times. It now forms the province of Perugia. The Umbrians were an ancient Italic people speaking a language akin to the Latin. See *Eugubine Tables*.

Umlaut, in philology, the change of a vowel in one syllable through the influence of one

of the vowels *a, i, u* in the syllable immediately following—a common feature in several of the Teutonic tongues.

Umpire, a person to whose sole decision a matter in dispute between two parties is referred. Specifically, in law, a third person to whom the dispute is referred for decision when, in an arbitration, the arbitrators do not agree.

Umritsir. See *Amritsir*.

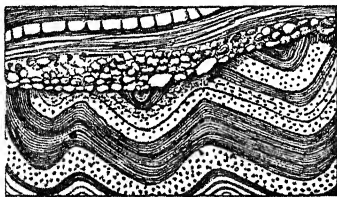
Unalash'ka, one of the largest of the Aleutian Islands (which see), being 75 miles long, and 20 miles at its extreme breadth. On it there are a number of volcanoes.

Unau, a species of sloth. See *Sloth*.

Uncaria, a genus of plants. See *Gambir*.

Uncial Letters, letters of a large size, used in ancient Latin and Greek manuscripts. These letters were compounded between the majuscule or capital and minuscule or small character, some of the letters resembling the former, others the latter. Uncial writing is supposed to have been employed in Latin MSS. as early as the 3d or 4th century, but was seldom used after the 10th.

Unconformable, in geology, a term applied to strata whose planes do not lie parallel



Unconformable Strata.

with those of the subjacent or superjacent strata but have a different line of direction or inclination. See also *Conformable*.

Uction, EXTREME. See *Extreme Uction*.

Undershot-wheel, a form of water-wheel having a number of float-boards disposed on its circumference, and turned round by the moving force of a stream of water acting on the float-boards at its lowest part. In this wheel the water acts entirely by its momentum.

Underwriter, the name given to individual marine insurers. Previous to 1824 these persons were not permitted to enter into any joint-stock action as a company, but wrote under policies of insurance with the sums for which they severally bound themselves. This system still prevails, though

there are now numerous companies whose business it is to grant marine insurances. The London underwriters form an influential society known as *Lloyd's* (which see).

Un'dine, a water-spirit of the female sex, resembling in character the sylphs or spirits of the air, and corresponding somewhat to the naiads of classical mythology. According to Paracelsus, when an undine married a mortal and bore a child she received a soul. One of these spirits is the heroine of a celebrated romance by De la Motte Fouqué.

Un'dulatory Theory, in physics, the theory which regards light as a mode of motion generated by molecular vibrations in the luminous source, and propagated by undulations in the subtle medium known as the ether, presumed to pervade all space and to occupy the intervals which separate the molecules or atoms of bodies. When these undulations reach and act on the nerves of our retina they produce in us the sensation of light. The only other theory of light which can be opposed to this, and which is variously called the *corpuscular*, *emission*, or *material theory*, supposes light to consist of material particles, emitted from the source, and projected in straight lines in all directions with a velocity which continues uniform at all distances, and is the same for all intensities. The undulatory theory is, however, now generally adopted by physicists.

Ungula'ta, the ungulate or hoofed quadrupeds, forming the largest and most important order of the mammalia. This order is subdivided into (a) the section *Perissodactyla*, or odd-toed ungulates, which includes the rhinoceros, the tapirs, the horse and all its allies; and (b) the *Artiodactyla*, or even-toed, which comprises the hippopotamus, the pigs, and the whole group of ruminants, including oxen, sheep, goats, antelopes, camels, deer, &c. In the former section the hind feet are odd-toed (one or three toes) in all the members, and the fore-feet in all except the tapirs; in the latter section the toes are always even in number, either two or four.

Unicorn, a fabulous animal represented as with one horn growing from its forehead. Such an animal is frequently mentioned by Greek and Roman writers, who generally describe it as a native of India, of the size and form of a horse, the body being white, and a straight horn growing from its forehead. The *reem* of the Hebrews, of which *unicorn* is a mistranslation (Deut. xxxiii. 17,

and elsewhere), was probably a urus. It was a two-horned animal. The unicorn is one of the supporters of the royal arms of Great Britain, in that posture termed *salient*. It was taken from the arms of Scotland, which had two unicorns as supporters.

Unicorn-root, a popular name of the plant *Aletris farinosa*, a native of North America, which furnishes one of the most intense bitters known, used as a tonic and stomachic.

Uniformity, ACT OF. See *Act of Uniformity*.

Unigenitus dei filius ('only-begotten son of God'; so called from the initial words), a bull of Pope Clement XI. (1713) which arose out of the Jansenist controversy. See *Jansenists*.

Unio. See *Mussel*.

Union, THE, in English history, the uniting of the parliaments of Scotland and England by the Act of Union, 1707; also, the legislative union of Ireland with Great Britain in 1800.—*The Union* is a term frequently applied to the United States of America.

Union Fabrics are textile fabrics made of a mixture of different materials, as cotton and wool, cotton and silk, and similar mixtures, in which flax, hemp, jute, &c., are mixed with other fibrous materials.

Union Flag, the national banner of the United Kingdom, is formed by the union of the cross of St. George (red on a white ground), the diagonal cross or saltire of St. Andrew (white on a blue ground), and the diagonal cross or saltire of St. Patrick (red on a white ground). The national flag of England was the banner of St. George (heraldically described as argent, a cross gules), and soon after the union of the crowns this was united with the Scottish national flag or banner of St. Andrew (in the language of heraldry azure, a saltire argent), thus forming the first union flag. On the legislative union with Scotland (1707) a new design for the national or union flag was adopted, described in heraldic terms as azure, a saltire argent surmounted by a cross gules fimbriated or edged of the second. On the union with Ireland (1800) the red cross or saltire of St. Patrick was introduced, thus producing the flag as it now exists. The union flag, when used by itself or as an independent flag, is the national banner always used on shore. When it occupies the upper corner or canton next the staff of a red, white, or blue field, the flag so formed is called

the red, white, or blue ensign, and in this form it is only used on board ship. The union flag is often spoken of as the 'union jack,' but this is not technically correct.

Unionist. See *Liberal Unionist Party*.

Union of South Africa, the title which, under the South Africa Act, 1909, belongs to the united colonies of Cape Colony, the Transvaal, Orange River, and Natal, as forming a single state under a common parliament and governor-general, the individual colonies taking henceforth the position of 'provinces.' The legislature is to consist of two houses, the senate and house of assembly, and is to meet at Cape Town, but Pretoria is to be the seat of government. Each province is under an 'administrator' and a provincial council.

Unit, in arithmetic, the least whole number, or one, represented by the figure 1. Every other number is an assemblage of units. This definition is applicable to fractions as well as to whole numbers. In mathematics and physics a unit is any known determinate quantity by the constant repetition of which any other quantity of the same kind is measured. It is not itself one, but is a length, or a surface, or a solid, or a weight, or a time, as the case may be, while 1 is only a numerical symbol.—*Specific gravity unit*: for solids or liquids, 1 cubic foot of distilled water at 62° Fahr. = 1; of air and gases, 1 cubic foot of atmospheric air at 62° Fahr. = 1. The *unit of heat*, or *thermal unit*, in Britain, the quantity of heat corresponding to a rise of 1° Fahr. in the temperature of 1 lb. of pure water at about 39° Fahr.; in France, the heat required to raise a gramme of pure water at about 3.94° C., 1° C.—In electricity units include the *ampere*, *coulomb*, *farad*, *ohm*, *volt*, and *watt*, according as electrical capacity, quantity, resistance, &c., are measured. The *watt* is a practical unit of work, 746 watts being equal to 1 horsepower.—In kinetics the *unit of force* is that which will produce a velocity of a centimetre per second in a mass weighing one gramme (15.432 grains) after acting upon it a second of time. A *dynamic unit* is one expressing the quantity of a force or the amount of work done. One such unit is the *foot-pound* (which see). The system of units recommended by a committee of the British Association for scientific calculations, and known as the *C.G.S. system*, adopts the *centimetre* as the unit of length, the *gramme* as the unit of mass, and the *second* as the unit of time, these words being represented

UNITARIANS—UNITED STATES.

respectively by the above letters. (See *Dynamics*.) In this system the *unit of area* is the square centimetre, the *unit of volume* is the cubic centimetre, and the *unit of velocity* is a velocity of a centimetre per second. The *unit of momentum* is the momentum of a gramme moving with a velocity of a centimetre per second.

Unitarians, a religious sect or congeries of sects, distinguished by the denial of the received doctrine of the Trinity. The Unitarians may be divided into classes: (1) The conservative or orthodox Unitarians, who accept the general articles of the Christian creed (with the exception of the Trinity), such as miracles, the resurrection of Christ, and the plenary inspiration of Scripture. (2) The liberal or progressive Unitarians, whose creed is purely rationalistic. They consider Christ as a mere man, inspired as other great men are, though in a greater degree; they reject the doctrines of original sin, eternal punishments, the belief in miracles, and generally the whole supernatural element in Christianity. They deny the necessity of an atonement, considering Christ's death but as a martyrdom in defence of truth. This latter class forms the majority. Unitarian views have been held more or less in all ages of the church, but they came more prominently forward during the Reformation period, especially in connection with the teaching of the elder and younger Socinus, Lælius and Faustus, uncle and nephew. (See *Socinus*.) At this time Unitarian doctrines led to persecution. The sect was first tolerated in Poland and Transylvania. In the former country it flourished under the leadership of the younger Socinus, in the latter under that of his friend Bladutra. The Polish toleration was finally withdrawn in 1658, when the Unitarians were banished under pain of death. They dispersed in Germany and England. Unitarianism in the meantime made secret progress among various Protestant bodies professing orthodox creeds. In England, where Unitarians were burned as well as on the Continent, full toleration was not granted till 1813. On the continent of Europe Unitarianism progressed in proportion to the progress of Rationalism. In America Unitarianism first sprang up in New England, from which it spread rapidly. The Universalist sect is also of non-Trinitarian belief. There are about 300 Unitarian congregations in Britain and 350 in America, and Unitarian theology has tinged more or

less almost every section of the reformed Christian church.

United Brethren. See *Moravian Brethren*.

United Greeks are Christians who originally belonged to the Greek Church, but whom the Roman Church has united with her own members on certain conditions. They retain the ancient rites, the Greek language during service, the strict Greek fasts, and the Lord's supper under both forms, in common with the old Greek Church. They are found chiefly in Italy, the Austrian monarchy, and Poland.

United Kingdom. See *Britain*.

United Presbyterian Church, the name adopted by that Scottish church which was formed by the union of the Secession Church and the Relief Church in May, 1847. This Church adhered to the theological doctrines taught in the Westminster Confession of Faith and the Larger and Shorter Catechisms. The system of church government differed from that of the Established and Free Churches only in having no intermediate court between the presbyteries and the supreme court, the latter of which was called a General Synod, and sat once a year. The distinguishing feature of the United Presbyterian Church was that it was a voluntary church, setting itself against all establishment or endowment of religion by the state. In 1900 it joined the Free Church to form the United Free Church of Scotland. See *Free Church of Scotland*.

United Provinces. See *North-west Provinces, India, Netherlands*.

United States of America, a federal republic, occupying the whole of the central portion of North America lying between lat. 24° and 49° N., and lon. 67° and 125° W.; stretching from east to west between the Atlantic and North Pacific Oceans, and from north to south between Canada and the Gulf and Republic of Mexico; greatest length, east to west, 2800 miles; greatest breadth, 1600 miles; area, over 3,000,000 square miles (see next page). The territory of Alaska also belongs to the United States, and Hawaii, the Philippines, Porto Rico, &c., have been recently acquired.

Area and Population.—The republic is now composed of 46 states, 3 territories, and 1 district, besides Alaska and the various dependencies. The first census was taken of the thirteen original states in 1790, when the population numbered 3,929,214. The various areas and populations are given

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in the following table, those marked * being the original states:—

STATES AND TERRITORIES.	Area in Sq. Miles.	Population, 1890.	Population, 1900.
<i>States.</i>			
Alabama.....	52,250	1,513,017	1,828,697
Arkansas.....	53,850	1,128,179	1,311,564
California.....	158,360	1,208,130	1,485,053
*Carolina, North.....	52,250	1,617,947	1,891,992
*Carolina, South.....	30,570	1,151,149	1,340,312
Colorado.....	103,925	412,193	589,700
*Connecticut.....	4,900	746,258	908,355
Dakota, North.....	70,195	182,719	319,040
Dakota, South.....	77,650	328,808	401,559
*Delaware.....	2,050	163,493	184,735
Florida.....	58,680	891,422	523,542
*Georgia.....	59,475	1,387,353	2,216,329
Idaho.....	84,800	84,385	161,771
Illinois.....	56,650	3,826,351	4,821,550
Indiana.....	36,350	2,192,404	2,516,463
Iowa.....	56,025	1,911,806	2,251,829
Kansas.....	82,030	1,427,096	1,469,496
Kentucky.....	40,400	1,858,635	2,147,174
Louisiana.....	48,720	1,118,517	1,381,627
Maine.....	33,040	661,086	694,306
*Maryland.....	12,210	1,042,390	1,189,946
*Massachusetts.....	8,815	2,238,943	2,805,346
Michigan.....	58,915	2,003,889	2,419,782
Minnesota.....	82,305	1,391,826	1,751,395
Mississippi.....	46,810	1,289,600	1,551,372
Missouri.....	69,415	2,679,184	3,107,117
Montana.....	146,030	132,150	243,289
Nebraska.....	76,855	1,058,910	1,068,901
Nevada.....	110,700	45,761	42,334
*New Hampshire.....	9,305	376,530	411,588
*New Jersey.....	7,815	1,444,933	1,833,669
*New York.....	49,170	5,997,353	7,268,009
Ohio.....	41,060	3,672,316	4,157,545
Oregon.....	96,030	313,767	413,532
*Pennsylvania.....	45,215	5,258,014	6,301,365
*Rhode Island.....	1,250	345,506	423,556
Tennessee.....	42,050	1,767,518	2,023,723
Texas.....	265,780	2,235,523	3,043,826
Utah.....	84,970	207,905	276,565
Vermont.....	9,565	332,422	345,641
*Virginia.....	42,450	1,655,980	1,854,184
Virginia, West.....	24,780	762,794	953,900
Washington.....	69,180	349,390	517,672
Wisconsin.....	56,040	1,636,880	2,063,963
Wyoming.....	97,890	60,705	92,351
<i>Territories.</i>			
Arizona.....	113,020	59,620	122,212
Hawaii.....	6,877	89,890	154,001
New Mexico.....	122,580	153,503	193,777
Oklahoma.....	39,030	61,834	398,345
Dist. of Columbia.....	70	230,392	278,718
States and Territories.....	3,000,157	62,712,240	75,776,778
Indian Territory.....	31,400	186,490	391,960
Indians.....		141,709	134,158
Territ. of Alaska.....	531,400	31,795	44,000
Total.....	3,562,957	63,072,234	76,346,836

In 1906 Oklahoma (which was constituted a territory in 1890) and the Indian Territory were united to form together the

state of Oklahoma. The coloured people in 1900 numbered 8,840,789. The Indians numbered about 250,000. The capital is Washington, the largest city is New York, the other large cities being Chicago, Philadelphia, Boston, St. Louis, Baltimore, and Cleveland.

General Features.—The United States have a coast-line which measures 12,609 miles, of which 6861 are on the Atlantic, 2281 on the Pacific, and 3467 on the Mexican Gulf. The most important indentations on the Atlantic are Massachusetts Bay; Long Island Sound, and in connection with it the Bay of New York; Delaware Bay; Chesapeake Bay; Albemarle and Pamlico Sounds; and the Gulf of Mexico. The Pacific seaboard is deficient in bays, but possesses in that of San Francisco, on the coast of California, one of the largest natural harbours in the world. There are few islands either on the Atlantic or Pacific coasts, the only one of any importance being Long Island. The country is traversed by two great mountain-systems. The loftiest and largest of these is what as a whole may be called the Cordilleras, which enters from Mexico, stretches northwards, and is continued into the Dominion of Canada. It has in its broadest parts a breadth of 1000 miles, and includes the ranges known as the Rocky Mountains, Sierra Nevada, Cascade Range, the Coast Ranges, the Blue Mountains, and various lofty plateaus. The great feature of this system is the Rocky Mountains (which see). The other mountain-system is the Appalachian, which stretches parallel to the Atlantic coast almost from the Gulf of Mexico to the St. Lawrence. It consists of a long plateau with various groups and ranges of hills, among which are the White Mountains in New Hampshire, the Green Mountains of Vermont, the Adirondacks of northern New York, the Catskills of south-eastern New York, the Alleghanies of Pennsylvania, &c. The great plain lying between these two mountain-systems belongs almost entirely to the basin of the Mississippi-Missouri, which enters the Gulf of Mexico. This, the chief river of the country and the longest in the world, is of immense importance as a highway of internal trade. Its principal tributaries are the Ohio, Arkansas, Red River, and Illinois. Various other rivers enter the Mexican Gulf, including the Río Grande del Norte, which separates the States from Mexico. The country west of the Rocky Mountains, be-

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longing to the basin of the Pacific, is drained by the Columbia in the north-west; the Sacramento, which discharges into the Bay of San Francisco; and the Colorado, which falls into the Gulf of California. Between the Alleghanies and the Atlantic the principal rivers are the Hudson, which contributes to form the harbour of New York; the Delaware, which falls into the bay of that name, and is navigable to Philadelphia; the Potomac, which falls into Chesapeake Bay, and is navigable to Washington; and the Savannah, which enters Savannah Bay. The chief lakes are Superior, Michigan, Huron, Erie, and Ontario, lying between the United States and Canada, and belonging partly to both, with Lake Champlain, and Great Salt Lake.

Geology and Minerals.—Geologically the United States roughly forms two large areas. One extends from the Atlantic to the base of the Rocky Mountains, and is occupied to a large extent by a great basin of Palæozoic formations, including the Cambrian, Silurian, Devonian, and Carboniferous divisions. In the other great geological area, which extends from the base of the Rocky Mountains to the Pacific, the Eozoic and Palæozoic formations which predominate are overlaid by rocks of the Secondary and Tertiary periods. The United States is the greatest producer of minerals in the world. The total value of all its mineral products amounts to about £290,000,000 per annum, fully one-third representing coal of all kinds and about a quarter representing iron. It stands first in the output of coal, copper, iron, lead, petroleum, and salt; only Mexico produces more silver, and only Germany more zinc; and it is one of the chief gold-mining countries. The only notable metal not among its resources is tin. Its annual output of coal is about 320,000,000 tons, fully one-fifth being anthracite. The anthracite comes almost wholly from Pennsylvania, which is also the chief producer of bituminous coal and altogether the principal mining state of the Union. Other notable producers of bituminous coal are Illinois, West Virginia, Ohio, Alabama, Indiana, Kentucky, Iowa, Kansas, and Missouri. About three-fourths of the total output of iron ore is obtained from a number of low ranges of hills near Lake Superior, in Minnesota and Michigan. The ore is smelted chiefly in Pennsylvania, Ohio, and Illinois, where fuel is abundant. Montana, Michigan, and

Arizona produce the bulk of the copper; lead comes principally from Idaho, Utah, and Colorado; zinc is mined in Kansas, Missouri, Arkansas, Illinois, and other states. The annual output of gold, chiefly from Colorado, California, and South Dakota, has a coining value of about £17,000,000; and silver is produced, mainly in Colorado, Montana, Idaho, and South Dakota, with a commercial value of about £7,000,000 per annum. The leading petroleum states are California, Ohio, Texas, West Virginia, Pennsylvania, Indiana, and New York, and natural gas, a valuable fuel, is produced in several states. Other minerals worthy of mention are granite, marble, phosphate rock, salt, quicksilver, aluminium, antimony, platinum, nickel, cobalt, manganese, graphite, gypsum, limestone, borax, asbestos, talc, and mica. Some precious stones are also obtained.

Climate, Flora and Fauna.—The United States, stretching over such a vast area and having such great tracts of mountain and plain, must necessarily present a great variety of climate. The mean annual temperature ranges from under 40° to 75°. The isotherm of 55° mean annual temperature crosses the centre of the country from east to west, passing through St. Louis. Places in the latitude of New York and Chicago have nearly the same mean temperature for the year as the British Islands. The mean annual rainfall for the whole country is about 30 inches, but there is a great difference in this respect between different parts. The rainfall is most abundant on the north-west Pacific coast, on the Gulf coast, and on the higher mountain ranges. On the Great Plains it is only 10-20 inches, and there are large desert stretches in the Rocky Mountain region with a rainfall of less than 10 inches. The distribution of forests is partly determined by rainfall. East of the Great Plains the country is well wooded, but the Great Plains themselves and great part of the mountain region are almost treeless. In Washington, Oregon, and northern California there are extensive forests of valuable conifers, including pines, red-wood, and sequoias. The principal trees of the east are white pine, now becoming scarce, yellow pine in several varieties, walnut, chestnut, oak, poplar, cherry, spruce, balsam, and hemlock. Lumbering is a flourishing industry in the Pacific forest region and around the great lakes chiefly. There is wide variety in the vegetation, which

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is semi-tropical in the south and has a semi-arctic character in the north. The western deserts are characterized by cactuses, the yucca, and the sage brush. Among the principal native animals, some almost exterminated, are antelopes, deer, bears, bison or buffalo, the American elk, the big-horn or Rocky Mountain sheep, the Rocky Mountain goat, prairie dogs, coyotes, wolves, opossums, and jack rabbits. The rattlesnake and other snakes are notable among reptiles.

Agriculture.—The total area occupied as farms in 1900 was 838,591,774 acres, of which 414,498,487 acres was improved land. The number of farms was 5,737,372. The most numerous class of farms is that between 100 and 500 acres, next that between 50 and 100 acres. The great majority of farms were cultivated by owners. Irrigation is absolutely essential to agriculture in the dry central and western regions. Among cultivated crops the most important are maize, grown in many of the central states, chiefly in Iowa, Illinois, Kansas, Nebraska, Missouri, Indiana, and Ohio; wheat, chiefly in Kansas, Minnesota, the Dakotas, Nebraska, Ohio, Pennsylvania, Indiana, Missouri, Washington, Illinois, and Michigan; oats, chiefly in Illinois, Iowa, Wisconsin, Minnesota; barley is favoured in a very few states; rye, in the north-east; buckwheat, mostly in New York and Pennsylvania; tobacco, principally in Kentucky, N. Carolina, Virginia, Wisconsin, Ohio, Tennessee, Connecticut, Pennsylvania, and Maryland; rice, mostly in Louisiana, Texas, S. Carolina, and Georgia; cane-sugar, in Louisiana and Texas; cotton, principally in Texas, Georgia, Mississippi, Alabama, S. Carolina, Louisiana, Arkansas, N. Carolina; beet-sugar, in California, Nebraska, and Utah; sorghum-sugar, in Kansas; maple-sugar, in the north-east; besides potatoes, sweet-potatoes, hay, hemp, flax, &c. Of fruits, the most noteworthy are apples, pears, plums, peaches, oranges, grapes, lemons, pineapples, and bananas. California is the chief fruit-growing state, but Florida is also of importance in this respect. Wine is made in California and other states. The canning of fruits and vegetables is an extensive industry, especially in California, New York, and Maryland. Horses are largely bred, and mules and asses in the southern states. Horned cattle and sheep are raised in great numbers, hog-rearing forms an important industry, and immense quantities of cheese,

butter, and condensed milk are made. Illinois is the chief state for slaughtering and meat-packing, and New York, Wisconsin, and Iowa lead in dairying.

Fisheries.—The total annual value of fishery products is about £11,500,000, to which the New England and Middle Atlantic States contribute more than half. The fish taken on the Atlantic coast comprise cod, haddock, mackerel, halibut, herring, shad, whiting, mullet, bass, sturgeon, menhaden, &c., besides oysters, for which Maryland is the principal state. Washington, Oregon, and Alaska have very extensive salmon-fisheries and export enormous quantities of canned fish. The fisheries are carefully fostered and regulated by government.

Manufactures.—The United States is one of the greatest manufacturing nations. The principal manufacturing states are New York, Pennsylvania, Ohio, Massachusetts, and Illinois. The principal industries are the iron and steel industries, the textile industries, slaughtering and meat-packing, lumbering, flour-milling, the working of copper, lead, and other metals, tanning and the manufacture of boots and shoes, brewing, the manufacture of chemicals, factory dairying, the making of agricultural implements and all kinds of machinery. The chief centres of some of the more important manufactures are as follows: iron and steel, in Pennsylvania, Ohio, Illinois, New Jersey, Indiana, Alabama, West Virginia, and New York; agricultural implements, in Illinois, Ohio, New York, Wisconsin, Indiana, Michigan, &c.; railroad and other cars, in Pennsylvania, Illinois, New York, Ohio, &c.; ship-building, in Philadelphia, New York, Baltimore, &c.; cottons, in Massachusetts (Fall River, Lowell, New Bedford, &c.), the Carolinas, Rhode Island, New Hampshire, Pennsylvania, Georgia, &c.; woollens, in Massachusetts, Pennsylvania, Rhode Island, and New York; flax and linen, in New Jersey and Massachusetts; silk, in New Jersey (Paterson), &c.; slaughtering and meat-packing, in Chicago, Kansas City, Omaha, &c.; flour-milling, in Minneapolis, &c.; leather, in Pennsylvania, Massachusetts, New York, Wisconsin, &c.; boots and shoes, in Massachusetts, New York, Ohio, Pennsylvania, New Hampshire; pottery, in Ohio, Pennsylvania, and New Jersey; chemicals, in New York, Pennsylvania, New Jersey, Michigan; glass, in Pennsylvania, Indiana, New Jersey,

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Ohio, Illinois, New York, &c.; paper, in New York, Massachusetts, Pennsylvania, Maine, Ohio, &c.

Commerce.—The United States, as regards foreign trade, is the third country of the world, being surpassed only by Britain and Germany. The value of imports of merchandise for the year ended June 30, 1907, was £286,884,000, of exports of domestic merchandise for the same year, £370,744,000. The principal classes of imports are raw materials, certain articles of food, and manufactured goods; the chief classes of exports are agricultural products and manufactured goods. Among commodities imported are sugar, coffee, chemicals, hides and skins, raw silk, rubber and gutta-percha, cotton goods, wool and woollen goods, silk goods, fruits, iron and steel and their manufactures, tin, tobacco and its manufactures, copper and its manufactures, furs, spirits and wines, tea, leather and its manufactures, earthenware and china, oils, fish, raw cotton, cocoa, glass, paper, &c. The principal commodities exported are raw cotton (a quarter of the total value), meat and dairy produce, iron and steel and their manufactures, grain and flour, copper and its manufactures, mineral oils, wood and its manufactures, cotton goods, animals, leather and its manufactures, tobacco and its manufactures, oil-cake, agricultural implements, vegetable oils, naval stores, chemicals, fruits and nuts, carriages and cars, paper, fertilizers, furs, rubber goods, books, sugar, glucose, &c. The principal countries imported from are Britain, Germany, Brazil, France, Cuba, Canada, India, Japan, Mexico, Italy, China, Belgium, Holland, Switzerland, Dutch East Indies, Argentine Republic, Philippines, Russia, Chile, Australasia, Austria-Hungary, British West Indies, Spain, &c. The exports are taken chiefly by Britain (one-third of whole), Germany, Canada, France, Holland, China, Japan, Mexico, Italy, Belgium, Cuba, Australasia, Argentine Republic, Spain, Russia, &c. In 1905 Britain imported from the United States to the value of £133,683,631, and exported to the United States to the value of £53,052,574. Britain's principal imports are raw cotton, cattle, bacon, beef, maize, petroleum, timber, lard, leather, wheatmeal and flour, tobacco, machinery, hams, copper, iron and steel, turpentine, and apples; and her principal exports to the United States are linen goods, cotton goods, metals, woollen goods, wool,

jute goods, skins and furs, chemicals, machinery, and china. The United States has a highly protective customs tariff.

Shipping and Ports.—The foreign trade of the country is carried on mainly in foreign bottoms. In 1905 the strength of the mercantile fleet was 24,681 vessels of 6,456,543 tons, of which 8897 vessels of 3,741,494 tons were steamers. The greater part of the tonnage belongs to the ports of the Atlantic and Gulf coasts and to those of the great lakes. The tonnage entered at all ports in the foreign trade in 1904-05 was 30,983,217, less than a quarter of it being American. One-half of the total tonnage entered is British, and Germany comes next in the American carrying trade. The Atlantic ports receive more than half of the tonnage entered. The principal seaports are New York (nearly a third of the whole tonnage), Boston, New Orleans, Philadelphia, Baltimore, Galveston, San Francisco, Mobile, Pensacola, Portland (Me.), Savannah, Wilmington (N.C.), and Newport News, besides the lake ports of Detroit, Duluth, Superior, Chicago, Buffalo, &c. The principal cotton-shipping ports are Galveston, New Orleans, Savannah, and New York; wheat is exported chiefly from Galveston, New Orleans, New York, Baltimore, and Superior; wheat flour mostly from New York and Baltimore; New York and Boston are the chief seaports for the export of beef, bacon, and hams; petroleum is exported chiefly by New York and Philadelphia; cattle are shipped at New York, Boston, Baltimore, and Philadelphia principally; New York, Baltimore, and New Orleans are the leading tobacco ports. The coasting trade is confined by law to United States vessels.

Internal Communications.—The first line of railway in the United States was opened in 1827 at Quincy, Mass. The present railway system has a total length of about 230,000 miles, which exceeds that of the whole of Europe. There are now several trans-continental railway routes from the Atlantic to the Pacific. The Western Union Telegraph Company's system has 200,000 miles of telegraph line, with 1,160,000 miles of wire; and the Postal Telegraph Cable Company controls 55,000 miles of line, with over 300,000 miles of wire. There are about 3,000,000 miles of telephone wire belonging to the American Telephone Company and associated companies. The extensive system of internal

communication by lake, river, and canal deserves mention.

Weights and Measures, Currency, &c.—The weights and measures are the same as those of Great Britain; but the old Winchester wine gallon, equal to '833 of an imperial gallon, the ale gallon equal to 1'01695 imperial gallon, and the Winchester bushel, equal to '9692 of an imperial bushel, are used instead of the imperial standards, and a cental of 100 lbs. is used instead of the cwt. The short ton of 2000 lbs. is used for many purposes. Accounts are kept in dollars = about 4s. 1½d. sterling, cents or hundredths, and mills or thousandths of a dollar. The currency is partly in paper and partly in specie. Gold is coined in double eagles = 20 dollars, eagles = 10 dollars, half-eagles, and quarter-eagles. Silver is coined in dollars, half-dollars, quarters, and dimes or 10 cents. There is a nickel 5-cent piece and a bronze cent. The country is divided east to west into time zones, the time in each zone being one hour later than that in the zone to the east of it. These zones have their time described thus: *Eastern Time* (5 hours later than Greenwich), New York and Washington; *Central Time*, Chicago and St. Louis; *Mountain Time*, Denver; *Pacific Time*, San Francisco.

Constitution, Government, &c.—The government of the United States is a Federal republic based on the constitution of 1787, drawn up by delegates from the thirteen original states, and subsequently amended. The constitution and modes of administration of the individual states bear a close resemblance to each other. Each state maintains its independence, and by means of a state legislature and executive (vested in a governor) has complete management of its own affairs. The combined states have one supreme legislature, which takes the name of Congress, and consists of a Senate and a House of Representatives. The Senate consists of two members from each state elected by its own legislature for six years, one-third of the whole body being renewable biennially. The House of Representatives consists of members chosen for two years by the people of the several states, in numbers proportioned to their population as ascertained by the decennial census. At present it is composed of 386 members, or one member for 193,284 inhabitants. The salary of a senator or a representative is 5000 dollars, with travelling expenses. Con-

gress meets at least once a year, and its leading powers are to levy taxes, duties, imposts, excises; to provide for the common defence and general welfare of the Union, to regulate commerce with foreign nations and among the several states, to coin money, declare war, raise and maintain an army and navy, &c. It is forbidden to the Federal government, among other things, to tax exports, to grant any title of nobility, or to give commercial preference to the ports of one state over those of another. The executive is vested in a president chosen for four years, but eligible for re-election. The electors who vote for the president are chosen by each state, in such manner as its legislature may provide, and are in this capacity known as the electoral college. The president and vice-president are chosen by the majority of this college, and in the case of an equality of votes the president is chosen by the House of Representatives, and the vice-president by the Senate. The president, who must be a native-born citizen, and who receives a salary of 50,000 dollars yearly, has the power, in concurrence with two-thirds of the Senate, to make treaties, appoint civil and military officers, levy war, conclude peace, &c. He has even a veto on the laws passed by Congress, at least until they have received the assent of two-thirds of both houses. The vice-president, who has a salary of 8000 dollars, presides in the Senate, and in case of death or permanent disability succeeds the president. The business of the executive is administered by a cabinet consisting of the secretary of state, secretary of war, secretary of the navy, secretary of the treasury, postmaster-general, secretary of the interior, attorney-general, secretary of agriculture, and secretary of commerce and labour, each of whom has an annual salary of 8000 dollars, and holds office during the pleasure of the president. The seat of the federal government is Washington, capital of the District of Columbia. The judicial powers of the Union are vested in a supreme court, presided over by a chief justice and eight associate judges, while each state appoints its own local judges. The state legislatures may deal with all matters not expressly reserved for the federal government by the constitution of the United States or falling within restrictions imposed by the state constitutions. Practically all criminal jurisdiction belongs to the states. The units of local government are rural townships, counties, cities, &c.

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Finance.—The general government derives its revenues chiefly from duties on imports and taxes on spirits, tobacco, banks, &c. The total federal revenue received in 1906-07 amounted to £169,345,280, the expenditure to £152,497,600. The largest items of expenditure are pensions, the civil service, army and navy. In 1850 the federal public debt did not amount to £14,000,000; but during the civil war (1861-65) it increased to £558,873,546. In 1905 it stood at £473,878,000.

Army and Navy.—It is enacted by Congress that there shall be no more than 100,000 enlisted men at one time, the term of service being three years. The actual present strength is about 65,000. The army as now organized consists of 15 regiments of cavalry, 30 regiments of infantry, an artillery corps, and 3 battalions of engineers. There is a general staff corps and a chief of staff as the supreme executive of the army. Certain regiments are composed of negro soldiers commanded by white officers. Each state has an unorganized militia, in which all men from 18 to 44 years of age capable of bearing arms ought to be enrolled. The strength of the efficient war navy, including ships building, is as follows: battleships, 22 modern, 4 older; armoured cruisers, 10 first-class, 5 second-class; monitors, 10; protected cruisers, 19; scouts, 3; destroyers, 16; torpedo-boats, 25; submarines, 12. All warships must be built within the country and of home material.

Education and Religion.—There is, throughout the country, no uniform system of education, the organization and management of the 'common' or state-supported public schools being left to each state, while considerable control is also given to local authorities. These common schools, which in rural neighbourhoods are called *district* schools, are usually public elementary schools, but in some states they include the higher grades. To maintain these common schools funds are supplied by each state from local taxation, or from the sale of public domains set apart as a permanent school fund. Attendance on elementary schools is compulsory in many states, but not in all. The percentage of illiterates, which was 17 in 1880, was 10·7 in 1900. Among native whites the percentage was only 4·6 in 1900, among foreign whites 12·9, among the coloured population 44·5. The number of pupils enrolled in elementary state common schools was 15,620,230 in

1904, in higher schools 635,803. The higher education is provided in numerous colleges and universities, with nearly 100,000 students in all. In many of these, however, the course of study does not rank high. The best known of them outside of the United States are Harvard University (Cambridge, Mass.), Yale University (New Haven, Conn.), Johns Hopkins University (Baltimore, Ind.), Cornell University (Ithaca, N.Y.), Columbia University (N.Y.), Princeton University (N.J.), Bowdoin College (Me.), Dartmouth College (N.H.), the University of Pennsylvania (Philadelphia), the University of Chicago, and the University of California. In addition there are special colleges for theology, law, medicine, the higher education of women, &c. The constitution of the States grants perfect equality to all creeds, and nearly all the sects and religious denominations existing in Europe are represented. Many new and strange religious sects have originated in the United States. The principal bodies are the Roman Catholics, Methodists, Baptists, Lutherans, Presbyterians, Protestant Episcopalians, Congregationalists, Disciples of Christ, Jews, Mormons, Quakers, Christian Scientists, and Unitarians.

History.—The first English colonies within the limits of the Union were settled by two chartered companies, called the Plymouth Company and the London Company. By the latter an expedition was sent out in 1607, and a settlement was made at Jamestown, in the present state of Virginia, while the Plymouth Company established a colony on Massachusetts Bay. Other settlers continuing to arrive, a colonial assembly was for the first time convened in 1619. At this time the foundation of the colonies of New England was laid by the 'Pilgrim Fathers', a body of Puritans numbering 100 who sailed from England in the *Mayflower*, and landed in 1620 in Massachusetts Bay, where they established themselves. Then another colony was founded in 1628 at Salem, and in 1630 still another was established in Boston. Rhode Island was first settled at Providence in 1636 by Roger Williams, who had been driven from Massachusetts for his religious and political opinions. The states of Maryland and Virginia were colonized chiefly by English Roman Catholics and royalist refugees, while the central states were, to a great extent, settled by Dutch and Swedes. But it is impossible to enter into details of the origin

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and progress of the different states now composing the Union. The most remarkable events of the colonial period were those connected with the wars which Great Britain and her colonies were obliged to wage with France, and which terminated in the cession of Canada, &c., to Great Britain in 1763 by the Peace of Paris at the close of the Seven Years' war.

No sooner was this peace concluded than the British parliament resolved to increase the revenue by a general stamp-duty levied in all the American colonies. Accordingly, the Stamp Act of 1765 was passed; but this, after opposition, was repealed next year, Britain still claiming, however, its right to tax. In accordance with this claim a duty, in 1767, was imposed upon tea, paper, glass, &c.; but the colonial opposition was such that three years later the duties were all repealed except the one upon tea. To such a pass had the opposition now come that in 1773, when British ships loaded with tea attempted to effect a landing in the port of Boston, a number of the inhabitants, disguised as Indians, seized them and threw the cargoes into the sea. In punishment of this, parliament passed the Boston Port Bill, which declared that port closed to all commerce, and transferred the seat of colonial government to Salem. From this time it became evident that a conflict was inevitable, and in 1775 hostilities actually commenced when a small British force, sent from Boston to destroy the military stores at Concord, was attacked by the colonists near Lexington, and forced to retreat. Before the end of April the British governor and army were besieged in Boston by a revolutionary force of 20,000 men; the northern fortresses of Ticonderoga and Crown Point were seized; and a continental congress which assembled at Philadelphia took measures to equip an army and navy, with George Washington as commander-in-chief. On June 17 the British attacked the intrenched position of the colonists on Bunker Hill, which commanded Boston harbour, and captured it, but in the following year they retreated to Halifax. This action induced the colonists to continue their resistance, and it was declared by the thirteen states assembled in congress that 'the united colonies are, and ought to be, free and independent states; that their political connection with Great Britain is, and ought to be, dissolved'. This resolution was embodied in a declaration of indepen-

dence, drawn up by Jefferson and adopted 4th July, 1776. The British government now sent an army against the colonists under the command of Sir William Howe, and in a battle on Long Island (August 1776) Washington was defeated with heavy loss. He retreated beyond the Delaware, and in order to defend Philadelphia, then the capital, was obliged to give battle on the Brandywine, where he was again defeated. Fortune, however, favoured the Americans in the north, where General Burgoyne surrendered to General Gates at Saratoga in October, 1777. This induced the French to enter the struggle in the spring of 1778, and subsequently Spain and Holland aided the Americans. At last the surrender of Lord Cornwallis with his army at Yorktown (1781) to a combined French and American force under Rochambeau and Washington, virtually terminated the war. On September 3, 1783, Great Britain formally recognized the independence of the United States by a treaty of peace signed at Paris, and in order still further to establish their position the states met at Philadelphia in 1787, and after four months' deliberation framed a constitution. This constitution, which still remains the basis of the government, came into operation in March, 1789, and George Washington was elected the first president.

The congress appointed by the thirteen states then proceeded to impose duties, establish a federal judiciary, organize the executive administration, fund the debt of the United States, and establish a national bank. In 1793 Washington was unanimously re-elected president, but in 1797 he refused to be elected for a third term. During his administration the states of Vermont, Kentucky, and Tennessee were admitted into the union. John Adams was elected second president, and it was while he held office that France made war upon the republic, the fighting taking place chiefly at sea. In 1800 the seat of government was transferred from New York, which had been declared the capital, to Washington. In 1802 Ohio was added to the Union, and next year its area was more than doubled by the addition of the great territory of Louisiana, purchased from France. Great Britain still claimed the allegiance of American naturalized subjects, and the right to search American vessels for British seamen. In 1807 the British frigate *Leopard* overhauled the United States fri-

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gate *Chesapeake*, near the entrance to Chesapeake Bay, compelled her to surrender, and took off four of her men. Reparation was asked in vain; some time later all trade with France and England was prohibited by act of congress, and in June 1812 war was declared against Britain. In the different engagements which took place by sea and land the success was varied, and in 1814 peace was arranged. After this the chief historical events were the wars against the southern Indian tribes and the acquisition of Florida from the Spanish in 1819; the annexation of Texas, which led to a war with Mexico in 1845; and the acquisition of New Mexico and Upper California, which were ceded to the United States on payment of the sum of 15,000,000 dollars to Mexico.

The period about 1857 was notable for the *free-soil* movement and the increasing difficulty of dealing with slavery. Texas had been introduced into the Union as a slave-holding state, and the endeavour to act similarly with regard to the territory of Kansas led to rioting. The question was still further complicated by disputes respecting the territory of Nebraska; and the insurrection (1859) at Harper's Ferry, led by John Brown, brought the question of the abolition of slavery to a crisis. The presidential election of 1860 turned to a great extent upon this question, and when Abraham Lincoln, the Republican candidate, was elected the slave-holding states considered themselves defeated, and South Carolina, Mississippi, Florida, Alabama, Georgia, Louisiana, and Texas formally seceded from the Union. These states formed themselves into a Southern Confederation (4th February, 1861), with Jefferson Davis as president, and they were subsequently joined, after hostilities had begun, by Virginia, North Carolina, Tennessee, and Arkansas. The custom-houses, arsenals, and United States buildings generally were seized and occupied by the Confederates in their own states, and every preparation made to organize a separate government. War was inevitable, and the first blow was struck on April 12, 1861, the Confederates proceeding to bombard Fort Sumter, which was forced to surrender. President Lincoln then called out by proclamation 75,000 volunteers, and the first battle on a large scale took place at Bull Run, south of Washington, where the Federal forces were completely defeated. During the remainder

of 1861 frequent collisions took place, almost always to the disadvantage of the North. In the spring of 1862 General Grant, for the Federals, captured Fort Donnellson, on the Cumberland River, and along with General Sherman obtained a victory over the Confederates at Pittsburg Landing, in Tennessee. In April the Federal fleet, under Admiral Farragut, ran past the forts at the entrance of the Mississippi, and seized New Orleans, which was occupied by the supporting land forces. An attempt was then made by General M'Clellan to invest Richmond, the capital of the Confederacy, but this was prevented by the Confederate generals Lee and 'Stonewall' Jackson, who drove back the Federals on the James River, where they established themselves. General Lee then assumed the offensive and moved with his whole army upon Washington, but he was intercepted on the banks of the Antietam by M'Clellan, and, after an obstinate fight, compelled to recross the Potomac. Soon afterwards M'Clellan was superseded by Burnside, and in December another advance to Richmond was commenced. This General Lee had anticipated, and intrenched himself behind the town of Fredericksburg, a position from which the Federals vainly endeavoured to dislodge him. Thus the year 1862 closed with no great gain on either side. In the following April General Hooker, superseding Burnside in the command of the army of the Potomac, commenced another movement towards Richmond, but was defeated by 'Stonewall' Jackson at Chancellorsville, where, by mischance, the latter was killed in the darkness by his own men. Following up this gain General Lee transferred his army to the valley of the Shenandoah, entered Maryland, and crossed into Pennsylvania. At Gettysburg he was obliged to turn upon the pursuing Federal forces under Meade, and after three days' desperate fighting and the loss of 15,000 men Lee was forced to retreat into Virginia. On the Mississippi the fortune of war was also in favour of the Federals. Aided by the fleet, which had dashed past Port Hudson and seized Natchez, General Grant had assumed the offensive and captured Vicksburg, while at the end of this year (1863) he inflicted a severe defeat upon Bragg at Chattanooga. In 1864 General Grant, as the result of his successes, was appointed Federal commander-in-chief, and at once he set himself to reorganize the

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Federal forces. He took command of the army of the Potomac himself, with which he proposed to meet Lee, while he despatched Sherman to operate against J. E. Johnston. In May Grant moved his main force across the Rapidan and immediately attacked Lee in The Wilderness, where severe fighting lasted for six consecutive days. Unable to rout the Confederates, Grant endeavoured by a flank movement to cut them off from Richmond, but Lee anticipated the attempt and foiled it. Thus baffled, Grant by a circuit crossed the James River, joined Butler, and attacked Petersburg, but was repelled, and obliged to begin a regular siege during the winter. Meantime Sherman, with a large Federal force, had defeated Hood (who superseded Johnston as commander in Georgia), had occupied Atlanta, crossed the country by forced marches, seized Savannah, and by Feb., 1865, was able to occupy Charleston and Wilmington. During this brilliant movement the forces under Lee and Grant had faced each other in the lines round Richmond, but in April, 1865, a general advance was made by the Federals. Lee defended Petersburg and Richmond with great skill and obstinacy, but after three days' sanguinary conflict the Confederate lines were broken, and Richmond lay at the mercy of the Northern armies. Lee retreated north of the Appomattox, but was closely followed by Grant, who captured the general and his whole army. The remaining Confederate armies in the field soon afterwards surrendered, and the four years' war ended in favour of the Federal government. In the course of the war the abolition of slavery had been proclaimed by President Lincoln, and he had just entered (April, 1865) upon his second term of the presidency when he was assassinated in Ford's theatre at Washington by J. Wilkes Booth.

As the states returned to their allegiance to the Union they were after a time readmitted to their state and national privileges. The election of General Grant to the presidency in 1869 served, in some measure, to consolidate matters. An amendment to the national constitution was proclaimed in March, 1870, and provided that no difference of race, colour, education, or religion shall debar any person from the rights of citizenship in any of the states. This question of equal rights as between the negro and

the white population is still beset with dangers.

The Treaty of Washington (1871) provided for the settlement by arbitration of three outstanding disputes with Great Britain. One of them concerned the claims based upon the depredations of the Confederate vessel *Alabama* (which see); the second bore on the disputed frontier between British and United States territory in the neighbourhood of Vancouver Island (see *San Juan Boundary Question*); and both of these were settled in favour of the United States. The third concerned the Canadian fisheries, and was decided against the United States. President Grant was re-elected in 1872, and was succeeded in the presidency by R. B. Hayes (1877-81), who ended the period of reconstruction in the South by withdrawing all Federal troops in 1877. At the presidential election of 1880 the Republicans elected their candidate, James A. Garfield, but he was shot dead by a disappointed office-seeker soon after beginning his term in 1881. In 1884 the Democrats were successful in securing the election of Grover Cleveland, who declared himself in favour of civil service reform and of a departure from the protectionist policy which had obtained since the Civil War. The Republican, Benjamin Harrison, was elected president in 1888, and the most noteworthy measure of his term of office was the highly protectionist Tariff Act of 1890, named after its chief promoter, William M'Kinley. Cleveland was again elected in 1892 and began his second term in 1893. This year was notable for the great Exposition at Chicago to celebrate the quater-centenary of Columbus's discovery, and for the submission to arbitration of the dispute with Canada regarding the seal-fisheries in the Behring Sea. Cleveland secured the passage of the Wilson Tariff Act of 1894, under which much of the protection of M'Kinley's Act was removed. In his message of Dec. 17, 1895, President Cleveland brought his country to the verge of war with Britain by claiming to interfere, on the basis of the Monroe Doctrine, in the boundary dispute between Venezuela and British Guiana, but an agreement to submit it to arbitration was reached in the following year. The presidential election of 1896 resulted in the election of the Republican, M'Kinley. The Dingley Tariff Act, a highly protectionist measure, was passed in 1897. Hawaii

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was annexed in the same year. The Spanish-American war of 1898, arising out of the Cuban revolution, ended in a hollow defeat of Spain, and by the treaty of Paris in 1899 Spain relinquished all claim to Cuba and ceded to the United States Porto Rico, Guam in the Ladrões, and the Philippine Islands. The Filipinos refused to accept the cession of their islands and formed a republican government, but after desultory fighting the Union proved itself able to assert its authority and establish civil government. Shortly after, several of the Samoan Islands were acquired by the States. The presidential election of 1900 was again won by McKinley. The Hay-Pauncefote treaty of 1901 superseded the Clayton-Bulwer treaty of 1850 (see *Clayton-Bulwer Treaty*), thus enabling the United States to undertake the construction of the Panamá Canal. In Sept. 1901, President McKinley was shot by an Anarchist, and his place was taken by the vice-president, Theodore Roosevelt, who has proved himself a man of great energy and political courage. He has indicated a desire for a relaxation of the protectionist policy, and has declared for legislative control of the huge industrial combinations known as *trusts*. In this latter proposal he has been backed by a great volume of public opinion. He has stood by the Monroe Doctrine in America's foreign policy, and has exerted his influence on the side of arbitration and peace. In 1904 he was elected for a second term by a large majority. His successor as president, William H. Taft, whose policy is similar, entered on office in 1909. An outstanding question between Britain and the Union, that of the Alaskan frontier, was settled in 1903. The great earthquake which caused the destruction of San Francisco in 1906 is one of the most striking events in the recent internal history of the republic.

Literature.—The first literary work of any consequence produced in the U. States was a translation of Ovid's *Metamorphoses* by George Sandys, written in Virginia (1620) and published in London (1626); and the first published book was a Puritan edition of the Psalms (Cambridge, U.S., 1640). The journals and annals of John Winthrop (1588-1649), governor of Massachusetts, Edward Winslow (1595-1655), governor of Plymouth colony, Nathaniel Morton (1613-85), &c., have been valuable to the historian. The most notable of the

earlier writers were the theologians, such as Increase and Cotton Mather, Roger Williams, and above all Jonathan Edwards. The succeeding or revolutionary era was chiefly remarkably for its political writers, among whom were James Otis (1725-83), Josiah Quincy (1744-75), John Adams (1735-1826), Thomas Jefferson (1743-1826), Alexander Hamilton (1757-1804), John Jay (1745-1829), James Madison (1751-1836), and the statesman and scientist Benjamin Franklin (1706-90). Of historical writings belonging to this period there were the *History of New England* by Hannah Adams, of the American revolution by William Gordon and David Ramsay, and the *Annals of America* by Abiel Holmes. Philology was represented at this time by Lindley Murray (1745-1826), and the compiler of the famous dictionary, Noah Webster (1758-1843). Among the theologians were the younger Jonathan Edwards (1745-1801), Samuel Hopkins (1721-1803), Timothy Dwight (1752-1817), Bp. W. White (1747-1836), John Murray (1741-1815), J. S. Buckminster (1784-1812). The list of poets includes Philip Freneau (1752-1832), John Trumbull (1750-1831), and Joel Barlow (1755-1812). The first well-known novelist was Charles Brockden Brown (1771-1810).

It was not, however, till the 19th century that the United States produced the higher forms of pure literature. The poets of this epoch may be headed by William Cullen Bryant (1794-1878), and following him come Richard H. Dana (1787-1879), Charles Sprague (1791-1875), J. G. Percival (1795-1856), J. R. Drake (1795-1820), Washington Allston (1779-1843), Fitz-Greene Halleck (1790-1867), and Mrs. Sigourney (1791-1865); the song-writers, F. S. Key, Joseph Hopkinson, G. P. Morris, Samuel Woodworth, John H. Payne (author of *Home, Sweet Home*), and Stephen C. Foster. The later and in part more famous names are J. G. Whittier (1807-92), H. W. Longfellow (1807-82), E. A. Poe (1809-49), James R. Lowell (1819-91), R. W. Emerson (1803-82), Walt Whitman (1819-92), R. H. Stoddard (1825-1903), E. C. Stedman (born 1833), Celia Thaxter (born 1836), Joaquin Miller (born 1841), Will Carleton (born 1845). From the roll of novelists we select for mention the names of James Fenimore Cooper (1789-1851), Washington Irving (1783-1859), Nathaniel Hawthorne (1804-64),

UNIVALVE—UNIVERSITY.

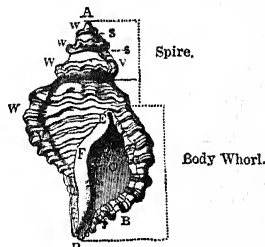
Mrs. Harriet Beecher Stowe (1812-96), Hermann Melville (1819-91), Bayard Taylor (1825-78), General Lew Wallace (1827-1905), W. G. Simms (1806-70), W. D. Howells (born 1837), Edward Eggleston (born 1837), E. P. Roe (1838-88), Bret Harte (1839-1902), Henry James (born 1843), Julian Hawthorne (born 1846), F. Marion Crawford (born 1854), G. W. Cable (born 1844), F. R. Stockton (1834-1902), J. Lane Allen, and Stephen Crane (1870-1900). The poets J. G. Whittier, Edgar Allan Poe, O. W. Holmes, and H. W. Longfellow have also written prose fiction. To these may be added the female novelists, Louisa M. Alcott, Adeline D. T. Whitney, Elizabeth Stuart Phelps, Rose Terry Cooke, Harriet Prescott Spofford, Mrs. S. P. W. Parton (Fanny Fern), Susan Warner, Augusta J. E. Wilson, Virginia Terhune (Marion Harland), Marion C. L. Reeves, and Frances Hodgson Burnett, American at least by long residence. Of American humorists the best known are Chas. F. Browne (Artemus Ward), Samuel L. Clemens (Mark Twain), C. H. Clark (Max Adeler), H. W. Shaw (Josh Billings), F. P. Dunne, C. G. Leland. Among leading American historians are George Bancroft (1800-91), W. H. Prescott (1796-1859), J. L. Motley (1814-77), Francis Parkman (1823-93), George Ticknor (1791-1871), and John Fiske (1842-1901). At the head of American essayists and general writers stands Ralph Waldo Emerson (1803-82), followed by James R. Lowell (1819-91), O. W. Holmes (1809-94), Henry D. Thoreau (1817-62), N. P. Willis (1806-67), R. G. White (1821-85), G. W. Curtis (1824-92), J. G. Holland (1819-81), J. T. Field (1817-81), T. B. Aldrich (1836-1907), and John Burroughs (born 1837).

Univalve, a mollusc with a shell composed of a single piece. The univalves include most of the Gasteropoda, as land-snails, sea-snails, whelks, limpets, &c. The majority of univalve shells are cone-shaped and spiral. In the simplest form the conical shape is retained without any alteration, as in the limpet. In most cases, however, the cone is elongated, sometimes forming a simple tube, as in Dentalium, but usually coiled up into a spiral.

Universalists, those who hold the doctrine that all men will be saved, in opposition to the doctrine of eternal punishment. A sect of this name was founded about 1750. They believe in the ultimate salvation of all men

and created spirits, and direct their criticism against an eternal hell, and in some cases even against any suffering after death. The name *Universalists* is sometimes applied to the Arminians in consequence of the *universality* which they ascribe to the operation of divine grace and their opposition to the doctrine of *particular* election.

University, a corporate body or corporation established for the purposes of instruction in all or some of the most important branches of literature and science, and having the power of conferring certain honorary dignities, termed *degrees*, in several faculties, as arts, medicine, law, and theology. In most cases the corporations constituting universities include a body of teachers or professors for giving instruction to students; but this is not absolutely essential to a university, and London University, for instance, was long merely an examining body. In the middle ages, when the term began to be used in reference to seminaries of learning, it denoted either the whole body of teachers and learners, or the whole body of learners, with corporate rights and under by-laws of their own, divided either according to the faculty to which they were attached, or according to the country to which they belonged (hence the 'nations' into which the students were classed, and which still exist in some universities). At a later period the expression *universitas literarum* (the whole of literature or learning) was used to indicate that all the most important branches of



Univalve Shell of *Buccinum undatum*.

A, Apex. n, Basal. c, Aperture. p, Anterior canal. f, Posterior canal. F, Inner lip, columellar lip or labium. g, Outer lip or labrum. p f e c, Peristome or margin of aperture. w, Whorls or volutions. s, Sutures, or lines of separation. v, Varix.—The last whorl of the shell, usually much larger than the rest, is called the 'body whorl,' the rest of the volutions constitute the 'spire.'

knowledge were to be taught in these establishments. Some, forming their notion of a university from the universities of Oxford

and Cambridge, suppose that it necessarily means a collection and union of colleges, that it is a great corporation embodying in one certain smaller and subordinate collegiate bodies; but this is not correct, for many universities exist in which there are no colleges. This is the case with most of the German universities, and in the Scottish universities there are no foundations which bear any resemblance to the English colleges. Oxford and Cambridge differ from most universities also in the fact that, though they possess a body of professors, little of the teaching falls to be done by these. The oldest of the European universities were those of Bologna and Paris, and these formed the models on which most of the other early universities were established, a papal bull being generally regarded as necessary to this. The United States possesses the largest number of institutions bearing the name of universities, but a large proportion are sectarian, and many represent only a single faculty. For the chief universities see under separate heads, and refer to the articles on the different countries.

University College, a college or teaching institution belonging to a university, or such as might belong to a university. The University College, London, is closely connected with London University. (See *London, University of*.) Some of these colleges after having had an independent existence have been conjoined into a university, as those that now form the University of Wales, namely: the *University College of Wales, Aberystwith*; *University College of South Wales, Cardiff*; and the *University College of North Wales, Bangor*. Certain others have been developed into full-blown universities (Liverpool, Leeds). Several university colleges still retain their separate existence, as at Bristol and Nottingham.

University College, Oxford, the oldest in the university, founded about 1253, though the exact date of its foundation is doubtful. Its first statutes date from 1280.

University Extension, a movement in Britain to extend the means of higher education to persons of all classes and of both sexes engaged in the regular occupations of life. Any community may avail itself of the privileges by forming a local committee, who provide the necessary funds and fix fees, &c. The mode of instruction consists of courses of lectures by specialist graduates of the universities, each lecture being preceded or followed by a class, in which the students are

orally examined by the lecturer, who also corrects written papers done at home. An examination is held at the end of each course and certificates awarded. The movement began in 1872 with Cambridge University, but Oxford did not go heartily into it till 1885. The London Society for the Extension of University Teaching within the Metropolitan Area was formed in 1876. Dublin University is associated in the work with Cambridge, and the Scottish universities also made experiments in various parts of the country. Home reading circles under the direction of leaders are one outcome of the movement. Another is the University College, Reading, an institution affiliated to Oxford University.

Unleavened Bread was that form of bread used (Lev. ii. and iv.) in the Jewish temple service, and which, by the Mosaic law, the people were required to eat during the seven days of the Passover (Ex. xii. 15). It was the simplest form of bread, and was made without fermentation.

Unna, a town of Prussia, prov. of Westphalia, with iron-foundries, machine-works, chemical works, &c. Pop. 11,800.

Unst, the most northern of the Shetland Islands; length, 10 miles; average breadth, between 3 and 4 miles. The soil is tolerably fertile, the pasture-grounds afford feeding for sheep, but fishing is the chief industry. Pop. 1940.

Unterwalden, a Swiss canton, bounded on the north by the Vierwaldstätter Lake, on the east by mountains which separate it from Uri, on the south by Bern, and on the west by Lucerne; area, 295 sq. miles. It is divided into two valleys, Upper and Lower (Obwalden and Nidwalden), by a forest called Kernwald, and these districts being also politically distinct, send each one representative to the Swiss Council. The chief town of Obwald is Sarnen, and of Nidwald, Stanz. Pop. 28,000. Both cantons are almost entirely Roman Catholic.

Unyo'ro, a district of Equatorial Africa, lying to the west and north of Uganda, to which it is tributary, and stretching to the Nile. See *East Africa (British)*.

Upa'n'shads, in Sanskrit literature, a name given to a series of treatises or commentaries on the Vedic hymns, the contents of which are partly ritualistic, partly speculative. They are of different dates, some of them being as old as several centuries B.C.

Upas, a tree common in the forests of Java, and of some of the neighbouring

islands, and found also in tropical Africa. It is a species of the genus *Antiaris* (*A. toxicaria*), nat. order Artocarpaceae. Many exaggerated stories were formerly current



Upas-tree (*Antiaris toxicaria*).

concerning the deadly properties of this plant, its exhalations being said to be fatal to both animal and vegetable life at several miles distance from the tree itself. The truth is, that the upas is a tree which yields a poisonous secretion and nothing more.

Upholsterer-bee. See *Carpenter-bee*.

Upolu, the chief of the Samoan islands in the South Pacific, belonging to Germany. Copra is its principal product. Apia is the capital. R. L. Stevenson latterly resided here, dying in 1894. Pop. 19,842.

Upsala, a town, Sweden, 45 miles north-west of Stockholm. It has a cathedral (archiepiscopal, the finest in Sweden), which contains the tombs of some Swedish kings and of Linnaeus; a celebrated university founded in 1477, with a library of about 250,000 volumes, a botanical garden, observatory, &c. Pop. 24,150.

Upupa. See *Hoopoe*.

Uræmia, a diseased condition of the body arising from the presence of urea in the blood, in consequence of the urine not being properly secreted, as in Bright's disease or other ailments, thus leaving in the blood elements that should be carried off.

Ural, a river of Russia, which rises in the Ural Mountains, forms part of the boundary between Europe and Asia, and enters the Caspian after a course of about 1000 miles.

Ural Mountains, a series of mountains and plateaus stretching nearly north and south between Europe and Asia, from the shores of the Arctic Ocean for a distance of about 1900 miles; highest summit, 5513

feet. There is but little striking scenery, and the rise is so gradual in some parts that the traveller from Perm to Ekaterinburg, for instance, hardly notices that he has crossed the chain. The Ural Mountains are celebrated for the mines of gold, platinum, copper, coal, and iron which they contain, and in the south are many broad valleys of remarkable fertility.

Uralsk, a town of Russia, on the Ural, 170 miles w.s.w. of Orenburg. It has a considerable trade, especially in fish and caviare. Pop. 26,055.

Urania, in Greek mythology, the muse of astronomy. She is generally represented holding in her left hand a celestial globe to which she points with a little staff.

Uranium, a rare metal, whose chemical symbol is U, atomic weight 238.5, specific gravity 18.4. The chief source of uranium is pitchblende. Metallic uranium is obtained in the form of a black powder, or sometimes aggregated in small plates, having a silvery lustre and a certain degree of malleability. It forms several oxides, which are used in painting on porcelain, yielding a fine orange colour in the enamelling fire, and a black colour in that in which the porcelain itself is baked. Its compounds are radioactive.

Uranus, in Greek mythology, the son of Gæa, the earth, and by her the father of the Titans, Cyclopes, &c. He hated his children, and confined them in Tartarus, but on the instigation of Gæa, Kronos, the youngest of the Titans, overthrew and dethroned him.

Uranus, in astronomy, one of the primary planets, and the seventh from the sun, discovered by Sir William Herschel in 1781. It was first called *Georgium Sidus* in honour of George III., and afterwards *Herschel*, in honour of the discoverer. To the naked eye it appears like a star of the sixth magnitude. Its mean distance from the sun is about 1754 millions of miles, and the length of the year



Urania, antique statue in the Vatican.

URARI—URIC ACID.

30,686·82 days, or about 84 of our years. Its mean diameter is estimated at about 33,000 miles. Its volume exceeds the earth's about 74 times, but as its mean density is only 0·17 (the earth's being 1) its mass is only about $12\frac{1}{2}$ times more. The length of its day is supposed to be between 9 and 10 hours. It is now generally admitted that this planet has four satellites, which differ from the other planets, primary and secondary (with the exception of Neptune's satellite), in the direction of their motion, this being from east to west, and they move in planes nearly perpendicular to the ecliptic.

Urari. See *Curari*.

Ura Tyube, a town of Russian Turkestan, in the district of Sir Darya, with walls and a citadel. Pop. 14,600.

Urban, the name of eight popes, of whom the most notable were: **URBAN II.** (Othon de Lagny), 1088–99, was elected by one party in the church, and in a council held at Rome he excommunicated his rival Clement III. and his supporter, the Emperor Henry IV. By his decision and energy he extended the power of the popedom, and it was at his instigation that the first crusade was undertaken, and Jerusalem captured.—**URBAN VI.** (Bartolommeo Prignano), 1378–89, so exasperated the cardinals by his reforming zeal that they caused a schism in the church by electing Clement VII. The two popes excommunicated each other until Urban died, under circumstances which suggested poisoning.—**URBAN VIII.** (Maffeo Barberini), 1623–44, was more of a temporal prince than a cleric, extending the power of the church by raising armies, building fortresses, and entering into an alliance with France against the powers of Austria and Germany. He condemned Galileo and Jansen, although he had a reputation for learning, and was a patron of literature and art.

Urbanists. See *Franciscans*.

Urbino, a town of North Italy, province of Pesaro e Urbino, 21 miles west by south of Pesaro. It is the see of an archbishop, and seat of a small university; the chief buildings are the ducal palace and the cathedral. It was the birthplace of Raphael, whose house is still shown. Pop. 16,000.

Urchin, *SEA*. See *Echinus*.

Urdu. See *Hindustani*.

Ure, **ANDREW**, M.D., F.R.S., chemist, born at Glasgow 1778, died 1857. He was educated at Glasgow and Edinburgh universities, where he graduated in medicine; became professor of chemistry at the An-

dersonian Institution (1804), director of the Observatory, Glasgow (1809), and was appointed analytical chemist to the Board of Customs (1834) in London. His chief works are: *A Dictionary of Chemistry* (two vols., 1821), *The Cotton Manufactures of Great Britain* (two vols., 1836), and *A Dictionary of Arts, Manufactures, and Mines* (two vols., 1837–39), enlarged by Dr. Robert Hunt (4 vols., 1875–78).

Ure'do, a genus of minute parasitic fungi, the species of which are parasitic on plants. The diseases called smut, brand, burnt ear, rust, &c., are caused by their ravages.

Ure'ter, the excretory duct or tube which conveys the urine from each kidney to the bladder. In man it is about the size of a goose-quill; and its length is from 16 to 18 inches.

Ureth'ra, in anatomy, the canal leading from the bladder to the external urinary opening, and serving for the excretion of the urine. In the male it is a complicated structure varying in length from 8 to 9 inches, and in the female it is a narrow membranous canal about $1\frac{1}{2}$ inch in length.

Urfa, a town of Turkey in Asia, in Upper Mesopotamia, seat of an Armenian bishop, and of a French and an American mission. Pop. 40,000.

Urga, a Chinese town in Northern Mongolia, on the river Tola, on the trade route between Peking and Kiachta. Pop. 30,000.

Uri, a canton in Switzerland, bounded by Schwyz, Unterwalden, Valais, Tessin, Grisons, and Glarus; area, 415 square miles. It is one of the most mountainous of the Swiss cantons, presenting a complete chaos of mountain masses, the most famous of which is the St. Gothard. An interesting mass is the Urirothstock, 9620 feet high. The most important portion of the canton is the valley of the Reuss, which enters the Lake of Uri, an arm of the Lake of Lucerne. The chief industry is cattle-rearing; sheep and goats are also numerous; and timber is exported. The inhabitants are mostly Roman Catholics, and speak German. Uri was one of the three original Swiss cantons. It is visited by many tourists. The capital is Altorf. Pop. 17,285.

Uric Acid, an acid which occurs in small quantity in the healthy urine of man and quadrupeds, and in much larger quantity in the urine of birds. Uric acid constitutes the principal proportion of the urinary calculi and the concretions causing the complaint known as the gravel.

U'rim, a kind of ornament or appendage belonging to the costume of the Jewish high-priest in ancient times, along with the *thummin*, in virtue of which he gave oracular answers to the people, but what the urim and thummin really were has not been satisfactorily ascertained.

Urinary Calculi. See *Calculus*.

Urine, an animal fluid or liquor secreted by the kidneys, whence it is conveyed into the bladder by the ureters, and through the urethra discharged. In its natural state it is acid, transparent, of a pale amber or straw colour, a brackish taste, a peculiar odour, and of a specific gravity varying from 1.012 to 1.030. The character of the urine, however, is apt to be altered by the state of health, the season of the year, age, food, and a variety of other causes. A knowledge of the urine in health, and of the variations to which it is subject in disease, is of the utmost importance to the medical practitioner. One of its morbid constituents is diabetic sugar. See *Diabetes*.

Urmiah. See *Urumiyah*.

Urn, a kind of vase, often one for holding the ashes of the dead. See *Cinerary Urn*, *Vase*.

Urode'la, an order of amphibian vertebrates in which the larval tail is always retained in the adult, the body being elongated posteriorly into the tail. There are two sections, the *Perennibranchiate Urodela*, in which the gills are retained through life, as in proteus, siren, &c.; and the *Caduceibranchiate*, in which the gills disappear at maturity, as in the newts and the salamanders.

Ursa Major and Ursa Minor. See *Bear*, *Great and Little*.

Ursine Seal (*Otaria ursina* or *Arctoccephalus ursinus*), one of the otaries or eared seals, a native of the North Pacific, about 8 feet long. Called also *sea-bear*.

Urson, a name given to the *Erethizon dorsatum*, or Canadian porcupine, which is 18 inches in length, and the quills of which are smaller than in the common porcupine.

Ursula, Sr., a virgin martyr, according to the legend a daughter of a prince in Britain put to death at Cologne by a horde of Huns, some say in 384, others in 453, together with 11,000 virgins who accompanied her. According to another reading the number of her companions was only eleven.

Ursulines, or **NUNS OF ST. URSULA**, a sisterhood founded by St. Angela Merici at Brescia, in 1537. They devote themselves

to the succour of poverty and sickness and the education of female children. They had many houses in France during the 17th century. The Canadian Ursulines date from 1639; the Irish from 1771. There are now four houses in Ireland and four in England.

Ursus. See *Bear*.

Urtica'ceæ, a nat. order of exogenous trees, herbs, and shrubs. In an extended sense the order includes the *Ulmæ*, or elm family; the *Artocarpeæ*, or bread-fruit family; and the *Cannabineæ*, or hemp family. But the order is more frequently confined to the *Urticeæ*, or nettle family, typical genus, *Urtica*. (See *Nettle*.) The juice of the restricted order is watery, not milky; the wood in the arboreous or shrubby species, which are all tropical, is soft and light. The fibre of the bark of some is valuable. It is in the restricted *Urticeæ* that species covered with stinging hairs are found.

Urubamba, one of the head streams of the Amazon (which see).

U'rubu, the native name of an American vulture, the *Catharista Iota* (black vulture or zopilote), very nearly allied to the turkey-buzzard, which it closely resembles. This voracious bird is common in the villages and towns of the Southern States of North America, acting as a scavenger.

Uruguay (u-ry-gwi'), a river of South America, which rises in Brazil, in the province of Santa Catharina, flows first westwards, then gradually turns south, and finally enters the estuary of La Plata opposite Buenos Ayres; length, about 800 miles.

Uruguay, or **REPUBLICA ORIENTAL DEL URUGUAY**, a state of S. America, bounded on the north and north-east by Brazil, on the east by the Atlantic, on the south by the Rio de la Plata, and on the west by the Uruguay, separating it from the Argentine Republic; area estimated at 72,150 square miles. The surface forms a vast undulating plain, generally flat, but broken in the interior by several ridges of moderate elevation. The principal river is the Negro, which divides the state into two nearly equal portions, and on the south-east frontier is the large lake of Merim. The climate is mild and healthy, the general range of the thermometer being from 32° to 90° F. The extensive plains are admirably adapted for agriculture, which has made rapid progress in recent years, wheat, maize, &c., being cultivated; but the rearing of sheep and cattle is still the principal industry.

The chief exports are hides, tallow, preserved meat, sheepskins, bones, wool, and cereals, while the chief imports are cotton goods, woollens, coal, and iron; total annual value of exports, over £8,000,000; of imports, £5,000,000. Britain and France are the countries which have the chief share of the trade. Montevideo is the capital and chief port. There is a small army and navy. The revenue and expenditure are each over £3,000,000; total debt, £20,564,000. Railways have a length of about 1200 miles. Primary education is by law compulsory; there are normal, secondary, and higher institutions, and a university at Montevideo. The Roman Catholic is the state religion, but all faiths are tolerated. The country is divided into nineteen departments, and by the constitution of 1830 it is governed by a president, a senate, and a house of representatives. Uruguay at one time formed part of the Spanish viceroyalty of Buenos Ayres, and the language of the country is Spanish. Pop. about 1,000,000.

Ur'umiyah, or **URUMIYAH**, a town of Persia, said to be the birthplace of Zoroaster, in the west of the province of Azerbaijan, situated near a lake of the same name, 65 miles south-west of Tabreez. The surrounding district is of surpassing fertility. Pop. about 30,000.—The lake, situated 4300 feet above sea-level, is about 80 miles long from north to south, by 20 miles broad. It is extremely shallow throughout.

Urumtsi, a city of Central Asia, in the Chinese province of Dzoungaria, on the northern side of the Thian-Shan Mountains. It was formerly of great commercial importance in the trade between Russia, Turkestan, and India. Pop. estimated at 30,000.

Urus, a kind of large ox which ran wild in Gaul at the period of the Roman invasion, as described by Cæsar, perhaps the wild ox such as still exists at Chillingham in Northumberland and Hamilton in Lanarkshire, or else the aurochs.

Usagara, part of the German possessions in East Africa, occupying an extensive area of country inland north of the river Rufiji. It has mountains of considerable height, and is generally fertile.

Usambara, a mountainous territory of German East Africa, situated about 50 miles N.W. of Zanzibar, extending inland from opposite the island of Pemba. The country grows rice, maize, india-rubber, and tobacco.

Usbecks, or **USBEKS**, a Turkish tribe which at one time formed the ruling class throughout Western Turkestan, in Bokhara, Khokand, Khiva, and Balkh, and partly also in Eastern Turkestan. In Western Turkestan they are now completely under the influence of Russia, but in the districts mentioned they still form the nobility and land-owners.

Use, in law, the benefit or profit of lands and tenements that are in the possession of a person who simply holds them for another person, the real beneficiary. He to whose use or benefit the trust is intended, enjoys the profits, and is called *cestui que use*. All modern conveyances are directly or indirectly founded on the doctrine of *uses* and *trusts*, which has been deemed the most intricate part of the property law of England.

Usedom (ô'ze-dom), a Prussian island in the Baltic, on the coast of Pomerania; area, 150 square miles. The inhabitants are employed in agriculture and fishing; chief towns, Swinemünde and Usedom. Pop. about 33,000.

Ushant (y-shant'; French, *Ouessant*), an island of France, 15 miles off the west coast of the department of Finistère, to which it belongs; area, 6 square miles. It presents a very bold and rocky coast; fishing and the rearing of sheep are the principal occupations. Pop. 2000.

U'shas, in Hindu mythology, one of the ancient elemental divinities, the goddess of the dawn. In the Vedic hymns she is represented as a young wife awakening her children and giving them new strength for the toils of the coming day.

Usher, an officer who has the care of the door of a court, hall, chamber, or the like. In the royal household of Britain there are four gentlemen ushers of the privy chamber. The *Gentleman usher of the black rod* is an officer of the order of the Garter (see *Black-rod*); the *Usher of the green rod*, an officer of the order of the Thistle. There are also ushers in the order of St. Patrick, the order of the Bath, &c.

Usher, or **USSHER**, JAMES, Archbishop of Armagh, born at Dublin 1580, died 1656. He took orders in 1601; in 1607 received the professorship of divinity at Trinity College, Dublin, and the office of chancellor of St. Patrick's; in 1620 the bishopric of Meath; in 1623 a place in the Irish privy-council; and in 1624 the primacy of Ireland. He was a man of great erudition, his chief works being the *Annales Veteris et Novi*

Testamenti, which forms the basis of the received biblical chronology; and *Britannicarum Ecclesiarum Antiquitates*.

Ushkup, or **USKUB**, a town of North-western Turkey, on the river Vardar, seat of a Greek archbishop, with manufactures and a large trade. Pop. 40,000.

Usk, parliamentary borough in Monmouthshire, on the river Usk, 12 miles s.w. of Monmouth. It unites with Monmouth and Newport in sending one member to parliament. Pop. 1498.—The Usk river rises on the border of Carmarthenshire and Brecknockshire, flows E. and s.e. for 57 miles to the Bristol Channel, 4 miles s. of Newport.

Ussuri, a river of Eastern Asia, a tributary of the Amoor, forming for a long distance the boundary between Russian and Chinese territories; length, 300 miles.

Usufruct, in law, the temporary use and enjoyment of lands or tenements, or the right of receiving the fruits and profits of lands or other things without having the right to alienate or change the property.

Usury. See *Interest*.

Utah (u'tà), one of the western United States, bounded by Idaho, Wyoming, Colorado, Arizona, and Nevada; area, 84,970 square miles. The Wahsatch Mountains divide Utah into two unequal portions; a hilly country on the east, drained by the Colorado, with its head streams the Green and Grand rivers, and numerous tributaries, and a high and generally sterile table-land on the west, the drainage of which falls into the different lakes. Of these the largest are the Great Salt Lake (which see) and Utah Lake, both in the north-west. Some peaks of the Wahsatch Mountains are 10,000 to 13,000 feet above sea-level, while the average elevation of the valleys is 5000 feet. Certain districts near the rivers are fertile and favourable to agriculture, but owing to the want of water the greater part of the soil is sterile. Cereals, potatoes, vegetables, and fruit are produced in the fertile districts, and cattle-raising is profitably carried on in the open plains. Valuable deposits of gold, silver, copper, lead, iron, coal, and other minerals exist, and the production of the mines is annually increasing. The lines of the Central Pacific and the Union Pacific Railways traverse the state. There is a university in Salt Lake City, and about 40,000 pupils are in average attendance at school. The Mormons have occupied this region since 1847. (See *Mormons*.) There are

now churches and schools of all denominations in Utah. The capital is Salt Lake City; other cities are Ogden, Provo, and Logan. Pop. 276,565.

Utah Lake, a fresh-water lake in Utah Territory, 30 miles s. of Salt Lake City. It is 25 miles in length n. to s., with an extreme width of 13 miles. Its waters are drained into Great Salt Lake by means of the river Jordan. Several Mormon towns are on its eastern shores.

Utahs, or **UTES**, a tribe of American Indians of the Shoshone family, living in New Mexico, Utah, Colorado, and Nevada. They practise hunting and fishing, but rarely engage in agriculture. They have now sold most of their lands to the United States government, retaining a large reservation in the south-west corner of Colorado.

Utakamand. See *Ootacamund*.

U'terus, or **WOMB**, an organ of females, situated between the bladder and rectum, in which the embryo is contained until it arrives at maturity, when it is finally born or expelled. In the virgin female it is somewhat pear-shaped, and measures about 3 inches long, 2 inches broad, 1 inch thick, and weighs about 1½ oz. It is divided into a *fundus* or base, a *body*, and a *cervix* or neck. It opens into the vagina by a transverse aperture (*os uteri*). The organ is retained in its place by certain ligaments derived from the peritoneum. Its internal cavity is small, and at each superior angle at the fundus a *Fallopian* tube or oviduct enters. These tubes convey the ova or eggs from the *ovary* (which see) to the uterus. In structure the uterus is composed of an outer serous coat, a middle muscular coat, and an inner mucous lining. The arteries of the uterus are derived from the internal iliac and the aorta; the veins are large, and are called *sinuses* in the impregnated state. The nerves spring from the inferior hypogastric and spermatic plexuses, and from the third and fourth sacral nerves. The womb is liable to many diseases, of which the most frequent and important are inflammatory affections and tumours. It is also liable to become displaced in various ways, from laxity of its ligaments and other causes (see *Prolapsus Uteri*).

U'tica, an ancient city of N. Africa, on the river Bagrada, near its entrance into the Mediterranean. After the destruction of Carthage, Utica became the capital of the Roman province. It was destroyed by the Arabs in the latter part of the 7th century.

U'tica, a city of the United States, in New York, situated on the right bank of the Mohawk, 95 miles west by north of Albany. It has cotton factories, boot and shoe factories, flour, grist, and saw mills, tanneries, foundries, machine-shops, &c.; and an extensive trade, greatly facilitated by the Erie Canal, and by several railways. Pop. 56,383.

Utilitarianism, the general name given to those schools of morals which define virtue as consisting in utility. The name is more specially applied to the school founded by Jeremy Bentham, of which the most recent exponent is John Stuart Mill, but there are many other developments of the same principle both in ancient and modern schools of morals. See *Ethics*.

Utopia, a name invented by Sir Thomas More, from the Greek *ou topos* (no place), and applied by him to an imaginary island, which he represents as discovered by a companion of Amerigo Vespucci. As described in his work called *Utopia*, written in Latin and published in 1516, the Utopians had attained great perfection in laws, politics, &c.

U'traquists. See *Calistines*.

Utrecht (*ŭ'trecht*), an important town of Holland, capital of a province of the same name, 23 miles south-east of Amsterdam. It is pleasantly situated on the Old Rhine, is traversed by two canals crossed by numerous stone bridges, and is surrounded by strong forts. The town is well built, and has several squares, promenades, a government house, a Protestant cathedral (a fine Gothic building), mint, handsome town-hall, palace of justice, &c. Educational establishments include a well-equipped university, a veterinary school, musical college, and schools for drawing and architecture. Utrecht is the central point of the Dutch railway system, and carries on an extensive trade in grain and cattle, and in the manufactures of the place, which include Utrecht velvet, carpets, floor-cloth, cottons, linens, chemicals, &c. Utrecht is the oldest town of Holland, and was called by the Romans *Trajectum ad Rhenum*, that is, 'Ford of the Rhine,' and later *Ultra-trajectum*. Pop. 112,796.—The province of Utrecht has an area of 532 square miles, with a pop. of 273,000. It is generally flat, is well watered by the Rhine, Vecht, Amstel, &c., and is better suited for dairy-farming and stock-rearing than for corn-growing.

Utrecht, PEACE OF, a series of separate treaties agreed upon at Utrecht by the

powers which had been engaged in the war of the Spanish Succession. On April 11th, 1713, the States-general, Prussia, Portugal, and Savoy, signed separate treaties with France. The emperor refused to accede to the peace, and his differences with France were subsequently adjusted by the treaties of Rastadt and Baden in 1714. By the treaty with England, France, among other things, recognized the Hanoverian succession, engaged never to unite the crowns of France and Spain, and ceded to Britain Nova Scotia, Newfoundland, St. Kitt's, and Hudson's Bay and Straits. Gibraltar and Minorca were also ceded on behalf of Spain. Holland retained the Spanish Netherlands until a barrier treaty was arranged with Austria. (See *Barrier Treaty*.) Louis XIV. recognized the title of the King of Prussia, who received a part of Spanish Guelderland, and the sovereignty of Neuchâtel in Switzerland, while renouncing the principality of Orange. Savoy and Nice were restored to the Duke of Savoy, who was recognized as presumptive heir to the Spanish monarchy, and received the title of king. Philip V. was not recognized till the conclusion of these treaties, but France treated for Spain, and formal treaties corresponding with those with France were afterwards signed with that power.

Utrera, a town of Spain, province of Seville, 18 miles S.E. of the city of Seville. It has a fine Gothic church and a Moorish palace. Pop. 14,318.

Utricularia, the generic name of the bladder-worts (which see).

Uttox'eter, an ancient town of England, in Staffordshire, 14 miles E.N.E. of Stafford. It carries on iron-founding, nail-making, &c. Pop. 5133.

U'vula. See *Palate*.

Uxbridge, a town of England, in Middlesex, on the Colne, 15 miles W. of London. It has an ancient church, an iron-foundry, breweries, brick-kilns, &c. There is a good trade in corn and flour. Pop. 8585. It gives name to a parliamentary division of Middlesex.

Uxmal, an ancient Indian town of Yucatan, Central America, about 35 miles S.W. of Merida. It is now an extensive group of ruins.

Uz, in the Old Testament, a region probably lying to the east or south-east of Palestine, known as the scene of the story of Job.

Uzbegs. See *Usbecks*.

V.

V, the twenty-second letter of the English alphabet, a labial, formed by the junction of the upper teeth with the lower lip, and a gentle expiration. It resembles the letter *f*, but is *sonant* and not like it *surd* or *hard*.

Vaal River, a river of South Africa, rises in the Quathlamba Mountains, separates the Transvaal and Orange River Colony and enters the Orange River; length 500 miles.

Vaccination, inoculation with the cow-pox—a disease akin to, but much less severe than smallpox—in order to prevent a person from catching the latter, or at least to make the attack much less severe. The practice of vaccination was introduced by Jenner, and it soon came into common use instead of inoculation. (See *Jenner* and *Inoculation*.) The usual method in vaccination is to make a few scratches across one another, with a clean lancet point, upon the upper part of the arm. The matter from the cow-pox, or from the vaccination pustule produced on another person, is then rubbed on the skin where the scratches have been made. If the vaccination proves successful a small inflamed pustule appears about the third day, and increases in size until the tenth day. On the eighth day the constitutional effects manifest themselves by slight pain in the part, headache, shivering, loss of appetite, &c. These subside spontaneously in one or two days. Afterwards the fluid in the pustule dries up, and a scab forms which disappears about the twentieth day, leaving a slight scar in the skin. Repeated vaccinations, with intervals of several years, have been recommended by medical authorities. In England the vaccination of all children, excepting those in an unhealthy or otherwise unfit condition, is compulsory within three months after birth; in Scotland the time is six months. In England since 1893 any parent who satisfies two justices or a stipendiary magistrate that he really believes that vaccination would be injurious may be exempted; so also in Scotland (1907).

Vaccinium, the genus to which the whortleberry belongs.

Vacuum, empty space, or space devoid of all matter or body. Whether there is such a thing as an absolute vacuum in nature is a question which has been much controverted. The existence of a vacuum was

maintained by the Pythagoreans, Epicureans, and Atomists; but it was denied by the Peripatetics, who asserted that 'nature abhors a vacuum.' The modern theory, which seems to be warranted by experience, is that an absolute vacuum cannot exist, the subtle medium known as ether being believed to be everywhere present. In a less strict sense a vacuum (more or less perfect) is said to be produced when air is more or less completely removed from an inclosed space, such as the receiver of an air-pump, a portion of a barometric tube, &c. In the receiver of the air-pump the vacuum can only be partial, as the exhaustion is limited by the remaining air not having sufficient elasticity to raise the valves. The Torricellian vacuum, that is, the space above the mercury in a carefully manipulated barometer tube, is more nearly perfect in this respect, but even this space is to some extent filled with the vapour of mercury. If, however, an air-pump receiver, filled with pure carbonic acid gas (so as to expel the air), be exhausted, a small vessel containing moist caustic potash, and another containing concentrated sulphuric acid, having been previously introduced, the remaining carbonic acid is taken up and a vacuum produced so nearly absolute that the electric spark fails to pass through it.

Vacuum-brake. See *Brake*.

Vacuum-tube. See *Geissler's Tubes*.

Vagrants, a class of persons of which the English law takes cognizance, the statutes dividing them into three grades: (a) idle and disorderly persons, or such as, while able to maintain themselves and families, neglect to do so; unlicensed pedlars or chapmen, beggars, common prostitutes, &c.; all such persons being liable to a month's imprisonment with hard labour. (b) Rogues and vagabonds, or such as have been convicted of being idle and disorderly persons, and have been found guilty of a repeated offence, fortune-tellers and other like impostors, persons gambling and betting in public, persons having no visible occupation, and unable to give a good account of themselves, &c.; such persons being liable to three months' imprisonment with hard labour. (c) Incorrigible rogues, or such as have been convicted as rogues and vagabonds,

and are guilty of the repetition of the offence, persons breaking out of legal confinement, &c.; all such persons being liable to twelve months' imprisonment with hard labour, whipping being added at the option of the judge.

Vaigatch (vîgâtsh), an island in the Arctic Ocean, off the northern coast of Russia, to which country it belongs. It is inhabited by a few Samoyedes, but is annually visited by a great number of Russians who come here to hunt and to fish.

Valais (vâ-lâ; German, *Wallis*), a southern canton of Switzerland, abutting on France and Italy; area, 2026 square miles. It is surrounded on all sides by sections of the Alps, with ridges 13,000 to 15,000 feet high, and magnificent glaciers. The Rhone traverses the whole length of the canton, forming the largest valley in Switzerland. The mountain slopes are covered with forests of pine and hard-wood trees, succeeded by productive orchards. Rich pastures support numerous cattle, the chief source of subsistence of the inhabitants; and in the lower valley of the Rhone there is much arable land, the finer fruits are grown, and silk-worms reared. The canton produces a good deal of wine. In the Upper Valais German, in the Lower French is spoken. The canton was admitted into the Confederation in 1553. Sion is the capital. Pop. 114,980.

Valdai Hills (vâl'di), a range of hills in Western Russia, averaging about 300 feet in height, but rising in Mount Popovagora to 1080 feet. They are well wooded, and contain the sources of the Volga, Dnieper, and Dîna.

Valdepeñas (vâl-de-pen'yás), a town in Spain, New Castile, province of Ciudad-Real, 110 miles south of Madrid. It is celebrated for a red wine. Pop. 20,688.

Val de Travers (vâl dé trá-vâr), a valley in the Swiss Jura, canton of Neuchâtel, drained by the Reuse flowing into the lake of Neuchâtel. It is cultivated in parts, and contains a deposit of asphalt, yielding annually upwards of 2000 tons. See *Asphalte*.

Valdivia, a seaport of Southern Chili, on the navigable Calle-Calle, 15 miles above its mouth. Pop. 9700.

Valence (vâ-lâns), chief town of the department of Drôme, France, on the left bank of the Rhone, 66 miles south of Lyons. It is an ancient place with some attractive modern features; has an ancient cathedral (Romanesque), modern hôtel-de-ville, college, normal school, hospital, statues, and

other monuments, &c. It has manufactures of silks, leather, metal goods, and other articles. Pop. 27,000.

Valencia, a city of Spain, capital of the province of the same name, on the Guadilaviar, 2 miles from the Mediterranean. It has much of the Moorish character, with mostly narrow winding streets, lined with good houses. It is an archbishop's see, and has a cathedral (greatly injured by modernization), a royal palace, an exchange, a general hospital, an academy of the fine arts, a university, and other institutions. Outside the walls are the bull-ring, a botanic garden, and the Alameda, a delightful walk bordered with orange, pomegranate, and palm trees. The chief manufactures are silk, linen, hemp, glass, cigars, paper, and soap. Valencia was founded by Junius Brutus, 140 B.C. Pop. 213,550. The old province of Valencia is now broken up into the three provinces of Valencia, Alicante, and Castellon de la Plana. It is one of the most fertile and pleasant regions of Spain.

Valencia, a town of Venezuela, about 30 miles south of the Caribbean Sea, connected by railway with Puerto Cabello. Pop. 36,145.

Valenciennes (vâ-lân-syen), a town of France (no longer fortified), dep. Nord, on the Scheldt, 30 miles south-east of Lille. It is a somewhat gloomy town with narrow streets, but is a busy industrial centre, and has forges, foundries, steel-works, &c.; but no longer makes the famous lace, though cambric is made. Pop. 31,000.

Valens, **FLAVIUS**, Roman emperor of the East, born in Pannonia in 328, and declared emperor of the East by his brother Valentinian I., who had already been elected emperor. The chief event of his reign was the war with the Goths under Athanaric, which lasted during the whole of Valens' reign. The Goths were several times defeated, and sued for peace, which was granted them (370). In 377 the Goths, driven southwards by the Huns, asked and received permission to settle on Roman territory. Irritated by the treatment they received at the hands of the imperial officials, they soon took up arms, and in 378 defeated Valens and destroyed the greater part of his army. Valens was never seen or heard of afterwards.

Valentia, or **VALENCIA**, a small fertile island off the south-west coast of Ireland, belonging to county Kerry, about 5 miles long by 2 miles broad. It has slate and flag quarries, and productive fisheries. The

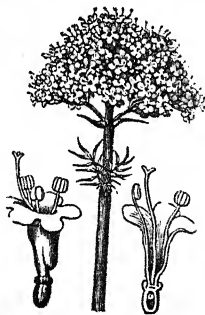
British Atlantic telegraph cables to Newfoundland start from Valentia, and there is here a lighthouse.

Valentine, St., a saint of the Roman calendar, said to have been martyred in 306 A.D. The custom of choosing valentines on his day (14th Feb.) has been accidentally associated with his name. On the eve of St. Valentine's day young people of both sexes used to meet, and each of them drew one by lot from a number of names of the opposite sex, which were put into a common receptacle. Each gentleman thus got a lady for his valentine, and became the valentine of a lady. The gentlemen remained bound to the service of their valentines for a year. A similar custom prevailed in the Roman Lupercalia, to which the modern custom has, with probability, been traced. The day is now celebrated by sending anonymously through the post sentimental or ludicrous missives specially prepared for the purpose. But this practice is also on the decline.

Valentinians, a sect of Gnostics (which see).

Valenza, a town of Northern Italy, province of Alessandria, pleasantly situated on the right bank of the Po. It has a cathedral of the 16th century. Pop. 7100.

Valerian (*Valeriana officinalis*), a plant of the order Valerianaceæ, native of Europe, which grows abundantly by the sides of rivers, and in ditches and moist woods in Great Britain. The root has a very strong smell, which is dependent on a volatile oil. It is used in medicine, in the form of infusion, decoction, or tincture, as a nervous stimulant and antispasmodic. Cats and rats



Valerian (*Valeriana officinalis*).

are very fond of valerian. *Valeriana rubra*, or red valerian, is occasionally found wild in Britain, and is cultivated in gardens, as well as many other species, on account of its elegant flowers. The valerian order consists of monopetalous exogens, annual or perennial herbs, rarely shrubs, inhabiting temperate climates, and most nearly related to

the Dipsacæ. Besides valerian it includes spikenard.

Valeria'us, PUBLIUS LICINIUS, Roman emperor from 253 to 260. He was taken prisoner by the Persians in 260, and his after fate is unknown.

Valerius Flaccus, CAIUS, a Roman epic poet who flourished in the reign of Vespasian, about 70-80 A.D. He was author of the *Argonautica*, a poem which extended to eight books, but was left unfinished.

Vallet'ta, or VALLETTA, a strongly fortified seaport, capital of Malta, on the N.E. coast, situated on an elevated neck of land, with a large and commodious harbour on each side. The town has wide streets paved with lava, spacious squares, and fine quays, lined with elegant buildings. From the inequality of the site the communication between the different streets is maintained by flights of steps. The cathedral, built in 1580, contains the tombs of the knights of Malta or of St. John (see *John, Knights of St.*), and in a chapel are the keys of Jerusalem, Acre, and Rhodes. Other notable buildings are the governor's residence, formerly the palace of the grand-masters; the library, museum, university, and the military hospital. The dockyard is capable of admitting the largest men-of-war. Some ship-building and various other industries are carried on, and the trade includes grain, wine, fruits, cotton, and other manufactures, coals, &c. The mail steamers for Alexandria, Constantinople, &c., call here, and it is the chief station of the British fleet in the Mediterranean. Pop. (with suburbs) estimated at 90,000. See *Malta*.

Valhalla, in Northern mythology, the palace of immortality, inhabited by the souls of heroes slain in battle, who here spent much of their time in drinking and feasting. The name is applied figuratively to any edifice which is the final resting-place of many of the heroes or great men of a nation, and specifically to an edifice built by Ludwig I. of Bavaria, a few miles from Ratisbon. See *Walhalla*.

Valkyr'ias, in Northern mythology, the 'choosers of the slain,' or fatal sisters of Odin, represented as awful and beautiful maidens, who, mounted on swift horses and holding drawn swords in their hands, presided over the field of battle, selecting those destined to death and conducting them to Valhalla, where they ministered at their feasts, serving them with mead and ale in skulls.

VALLADOLID — VALPARAISO.

Valladolid (vāl-yā-do-lid'), a city of Spain, capital of the province of the same name, 98 miles north-west of Madrid. It has a cathedral, many churches and suppressed convents, three hospitals, and a university. The manufactures consist of silks, cotton and woollen goods, hats, jewelry, paper, &c. Pop. 68,746.—The province has an area of 3042 square miles, and a population of 278,561. It is well watered

by the Douro and its tributaries, and is very fertile.

Valladolid, a city of Mexico, same as Morelia (which see).

Vallejo (val-ā'hō or vāl-yā'hō), a city and seaport of California, on an arm of San Pablo Bay. It has a spacious harbour, and near it is a United States navy-yard. Large quantities of grain are shipped. Pop. 7965.



Grande Place, Valladolid.

Vallière. See *La Vallière*.

Vallisneria, a genus of aquatic plants, of the natural order Hydrocharidaceæ. They grow at the bottom of the water, and the male and female flowers are separate. When the time of fecundation arrives the male flowers become detached, and float on the water; the female flowers develop long spiral peduncles, by means of which they reach the surface, where they are fertilized by the male flowers. *V. spiralis* grows in still waters in Italy, and in the Rhone; it is commonly grown in aquaria.

Vallombrosa, formerly an abbey in a wooded valley of the Apennines, belonging to the diocese of Fiesole, in the Florentine territory, where Giovanni Gualberto founded a house for monks in 1038, subject to the rule of St. Benedict. The building (dating from 1637) now accommodates an institute of forestry.

Valmy, a village of France, dep. Marne, celebrated for the affair known as 'the can-

nonade of Valmy,' where the French republican troops under Kellermann defeated the Prussians in 1792.

Valois (vāl-wā), **HOUSE OF**, a dynasty which ruled France from 1328 to 1589. In 1285 Philip III. gave the county of Valois (now in the departments Oise and Aisne) to his younger son Charles, and upon the extinction of the Capet dynasty in 1328 the eldest son of this Charles of Valois ascended the French throne as Philip VI., and founded the Valois dynasty, which was followed by the house of Bourbon. See *France (History)*.

Valonia, a substance used chiefly in tanning operations, and brought in quantities from the Levant. It is the acorn-cup of the *Quercus Egilops*. See *Tanning*.

Valparaiso (vāl-pā-rī'sō), the principal port of Chili, capital of the province of Valparaiso, situated on a large bay of the Pacific, 90 miles W.N.W. of Santiago. The bay is open to the north, but well sheltered from winds in other directions, and is capable

attack animals and suck blood from them is not quite clear. One species at least, known as the vampire-bat (*Vampirus spectrum*), of large size and having formidable teeth, seems to be conclusively acquitted of the charge, its regular food being fruits and insects. It has large leathery ears, an erect spear-like appendage on the tip of the nose, wings when extended measuring 28 inches. Several bats, however, have been proved to be blood-suckers, the best-known being *Desmodus rufus*, a species only about 4 inches long and 15 or 16 in expanse of wing. It has large prominent upper incisors of peculiar shape, and upper canines somewhat similar, and the stomach and intestines are evidently specially adapted for a diet of blood. This species of bat seems to be generally distributed throughout the warmer parts of S. America from Chile to Guiana. The blood-sucking propensities of these bats are by no means so dangerous as formerly and popularly described; but there is little doubt that they do attack horses and cattle, and sometimes even man in his sleep.

Van, chief town of a vilayet of the same name in Armenia, Asiatic Turkey. It is pleasantly situated near Lake Van, and is overlooked by an old citadel. Cotton cloth is manufactured and exported. Pop. 30,000. —Lake Van is a salt-water lake, 5467 feet above sea-level; area, about 1600 square miles. It contains many islands, and has no visible outlet.

Vana'dium, a metal discovered in 1830, and found in Europe, N. America, Argentina, &c.; chemical symbol V; atomic weight 51.2. It has a strong metallic lustre, considerably resembling silver, and is used as a valuable ingredient in steel. When in mass it is not oxidized either by air or water at ordinary temperatures, but when rapidly heated in oxygen it burns brilliantly.

Vanbrugh (van-brŭ'), **SIR JOHN**, English architect and dramatist, born about 1666, and educated partly in England and partly in France. He entered the army, became well known in London as a man of fashion, and then turned his attention to play-writing. His first play, *The Relapse*, was brought out at Drury Lane about 1697, and was followed by *The Provoked Wife*, and *Æsop*. The first two of these had all the wit and most of the freedom of treatment which characterized that period, but *Æsop* was moral and dull, and therefore unsuccessful. How he obtained his knowledge of architecture is not known, but at this time (1702) Vanbrugh

designed Castle Howard, the seat of the Earl of Carlisle. Afterwards he entered with Congreve into a speculation to build a great theatre at the west end of London, in which he was his own architect; but it did not prove a success. In 1706 he was commissioned by Queen Anne to present the garter to the Elector of Hanover, and the same year he was occupied with the erection of Blenheim Palace. This work got him into considerable pecuniary trouble, as parliament, which voted it, voted nothing for its payment. He built many other mansions for the nobility; in 1714 he was knighted by George I.; in the following year appointed controller of the royal works, and in 1716 surveyor of Greenwich Hospital. He died 26th March, 1726. Vanbrugh's plays are admirable in dramatic conception as well as in wit, and his architectural works received the approval of Sir Joshua Reynolds.

Van Buren, **MARTIN**, eighth president of the United States, born at Kinderhook, New York, 1782; died 1862. He early studied law, and in 1812 was elected to the state senate. He was attorney-general from 1815 to 1819, and in 1821 was elected United States senator. In 1828 he became governor of New York, and in the following year President Jackson appointed him secretary of state. In November 1832 he was elected vice-president, and in 1836 became president of the United States. The difficulties which his administration had to face were chiefly connected with the deposit of state funds in private banks, and his method of dealing with these brought about his defeat at the next election in 1840. He was again nominated by the Democrats in the elections of 1844 and 1848, but was unsuccessful on both occasions. He wrote a treatise entitled *An Inquiry into the Origin and Course of Political Parties in the United States* (1867).

Vancouver, **GEORGE**, English navigator, born about 1758, died 1798. He entered the navy as midshipman in 1771; accompanied Cook on his second and third voyages (1772-74 and 1776-79); was made first lieutenant in 1780; and served in the West Indies until 1789. In 1790 he was put in command of a small squadron sent to take over Nootka from the Spaniards, and was also charged to ascertain if there was a north-west passage. He sailed in the *Discovery*, April 1, 1791, spent some time at the Cape, and afterwards made for Australia

VANCOUVER — VAN DIEMEN'S LAND.

and New Zealand, parts of the coasts of which he surveyed. Having received formal surrender of Nootka, he spent the summers of 1792-94 in surveying the coast as far north as Cook's Inlet, wintering at the Sandwich Islands. He returned by way of Cape Horn, and reached England in 1795, where a narrative of his voyage was published in 1798. Vancouver Island was named after him.

Vancouver, the largest city of British Columbia, on Burrard Inlet, which opens on the Strait of Georgia, and forms a fine harbour, at the western terminus of the Canadian Pacific Railway. It is a fine city, with a great future before it, and has a large trade with American and Asiatic ports in timber, coal, fruit, &c. It dates back only to 1885. Pop. 60,000.

Vancouver Island, an island in the Pacific, off the west coast of British Columbia, of which province of Canada it forms part;

the seas and lakes abound with fish. Salmon are exported, and there is a trade in furs. Settlement is almost confined to the south-east, where are situated Victoria, Esquimalt, and Nanaimo, all connected by railway. The first is the chief town, and the capital of British Columbia, with an excellent harbour. The construction of the Canadian Pacific Railway added greatly to the importance of the island. Pop. about 50,000.

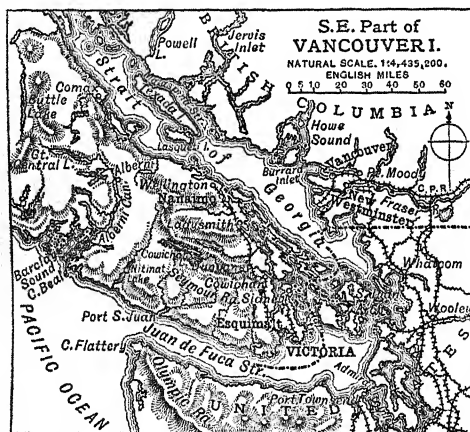
Vandals, a German nation or confederation, probably allied to the Goths, who occupied at an early period the country on the south of the Baltic, between the Oder and the Vistula. At a later period they appear to have descended into Silesia, and subsequently occupied Pannonia, Moravia, and Dacia. In 406, in conjunction with a German host, they ravaged Gaul, and thence found their way into Spain. After defeating an allied army of Goths and Romans,

they seized Seville and Carthage, and, led by Genserik, crossed to Africa. Here they vanquished the Roman governor (429), and founded a kingdom, which absorbed the greater part of the Roman possessions. Genserik immediately began to revive the maritime glories of Carthage, and extended his conquests to Sicily, Sardinia, and Corsica. He also invaded Italy and sacked Rome in 455. Genserik concluded a long reign in peace in 477. The kingdom of the Vandals was continued under his descendants—Huneric, his son, who immediately succeeded him; Gundamund, 484; Thrasimund, 496; Hilderic, 523; Gelimer, 530. It was overthrown in 534 by Belisarius, the general of the eastern Emperor Justinian.

Vanderbilt, CORNELIUS, American capitalist, born 1794, died 1877, amassed immense wealth in connection with shipping and railroads, a share of which he left to his eldest son WILLIAM HENRY, born 1821, died 1885, who was supposed at his death to be the wealthiest man in the world. The Vanderbilt University (Methodist Episcopal) at Nashville, Tennessee, was founded by Cornelius Vanderbilt, who presented it with 1,000,000 dols.

Van der Velde. See *Velde*.

Van Diemen's Land. See *Tasmania*.



length, from 250 to 300 miles; breadth, from 10 to 70 miles; area, about 15,000 square miles. It is generally mountainous, and heavily timbered. The climate is temperate, and the soil, in the south and east, fertile and favourable to agriculture and fruit-growing. The interior is rocky, interspersed with small grass tracts suitable for pasturage, and with lakes and small streams. Much coal is raised and exported at Nanaimo on the south-east coast, and gold, copper, iron, and other minerals are found. Horses, cattle, and sheep thrive well, and

VANDYCK — VANILLA.

Vandyck (van-dik'), **SIR ANTHONY**, except perhaps Titian the greatest of all portrait-painters, was born at Antwerp on the 22d of March, 1599, where his father was a merchant. He studied painting first under Van Balen, and then under Rubens, quitting the studio of the latter after a few



Sir Anthony Vandyck.

years to proceed to Italy, where he spent about five years (1623-28) chiefly at Genoa, Venice, and Rome, and then returned to Antwerp. Having acquired a great reputation as a portrait-painter he was invited to England by Charles I., who bestowed upon him the honour of knighthood, a considerable annuity, and a summer and winter residence. The painter rewarded this generosity by unceasing diligence, and executed, besides a multitude of portraits, several mythological and historical paintings. He was fond of splendour, and lived in a very expensive style, and latterly he was united in marriage to Mary Ruthven, a granddaughter of the Earl of Gowrie. Shortly afterwards he died (December 9, 1641), and was buried in St. Paul's. Vandyck's great strength lay in portrait-painting, and he excelled in the knowledge of *chiaroscuro*, but he sometimes amused himself with engraving and etching.

Vandyke Brown, a pigment obtained from a kind of peat or bog-earth, of a fine, deep, semi-transparent brown colour; so called from its being supposed to be the brown used by Vandyck in his pictures.

Vane, **SIR HENRY**, English statesman and writer, born in 1612, eldest son of Sir Henry Vane, secretary of state. He was educated at Westminster and Oxford, after-

wards completing his education at Geneva, where he became a puritan and a republican. Returning to England, he found that his religious and political opinions exposed him to much ill-will and annoyance, and he consequently emigrated to New England, arriving at Boston in 1635. He was elected governor of Massachusetts in 1636. In 1637 he returned to England, after which he was knighted, entered parliament, and became treasurer of the navy. He took part in the impeachment of Strafford, and was a zealous supporter of parliament in the civil war and one of the leaders in the Long Parliament. He was also a supporter of the Solemn League and Covenant. He was averse to the execution of the king, and came into conflict with Cromwell in consequence of the forcible dissolution of the Long Parliament (1653). In 1656 he was imprisoned in Carisbrooke Castle for four months, by order of Cromwell, on account of a pamphlet he had written. On his release he continued to resolutely oppose the government of Cromwell and of his son Richard. In 1659 he was a member of the committee of safety and president of the council of state. After the Restoration he was sent to the Tower (Feb. 1660), and subsequently moved from prison to prison. A rising of the Fifth Monarchy party (Jan. 1661) led to increased severity towards him, and he was tried for high treason before the Court of King's Bench, June 2, 1662, condemned, and beheaded on Tower Hill on June 14th. He wrote various theological works characterized by excessive mysticism, and his religious views gave rise to a small circle of disciples known as Vanists.

Vanilla. See *Lapwing*.
Van Eyck. See *Eyck*.
Vanilla, a flavouring agent used in confectionery, and in the preparation of liqueurs, procured from the fruit of *Vanilla aromatica* and *V. planifolia*, orchidaceous plants of tropical America, remarkable on account



Vanilla (*Vanilla aromatica*).

of their climbing habit, and now cultivated in various tropical countries, including Ceylon and India. It has a fragrant odour, and is also used in medicine as a stimulant and promoter of digestion.

Vannes (vân), a seaport of France, capital of the dep. Morbihan, Brittany, an interesting old place, with remains of ancient walls and gates, now surrounded by modern suburbs. There is a cathedral, and a museum rich in Celtic antiquities. Pop. 21,500.

Vanua Levu. See *Fiji*.

Vanucci (vâ-nût'che). See *Perugino*.

Vapour, in physics, a term applied to designate the gaseous form which a solid or liquid substance assumes when heated. Vapour is, therefore, essentially a gas, and seeing that all known gases have now been proved to be liquefiable, no physical difference can be said really to exist between an ordinary gas, such as oxygen, and a vapour, such as steam. In common language, however, a difference is usually recognized; a *gas* is a substance which at ordinary temperatures and pressures exists in a state of vapour; while a *vapour* is produced by the application of heat to a substance which normally exists in a solid or liquid form. The difference has been otherwise explained to be one not so much of kind as of degree; steam in the boiler of a steam-engine being said to be in a state of vapour, while superheated steam is said to be a gas. Aqueous vapour formed on the surface of the land and water is always present in suspension in the atmosphere, and when it meets with a reduction of temperature it condenses into water in the form of rain or dew.

Var, a department in the south-east of France, bordering upon the Mediterranean, and covered in the interior with ramifications of the Alps; area, 2349 square miles, of which only a small portion is arable. There are magnificent forests of pine and oak, and the vine, olive, mulberry, and tobacco are extensively cultivated. Minerals include salt, lead, coal, marble, gypsum, and building stone. The manufactures consist of woollens, perfume, liqueurs, olive-oil, soap, leather, and silk. The coast is bold and deeply indented; and the fishing, both of tunny and anchovies, is actively carried on. The capital is Draguignan. Pop. 326,384.

Varangians, or **VARAGIANS**, the name applied to the Norse vikings, who, at the close of the 9th century, founded various principalities in Russia. Some of them afterwards

entered the service of the Byzantine emperors, and became the imperial guards at Constantinople. Here they were recruited by Anglo-Saxons and Danes, who fled from England to escape the Norman yoke.

Varan'idæ. See *Monitor*.

Varasdin, a town of Austria, capital of a county of the same name in Croatia. It has an old castle, several Roman Catholic churches, a high school, and manufactures of tobacco, liqueurs, vinegar, and silk wares. Pop. 12,930.

Variable Quantities, in mathematics, such quantities as are regarded as being subject to continual increase or diminution, in opposition to those which are *constant*, remaining always the same; or quantities which in the same equation admit of an infinite number of sets of values. Thus, the abscissas and ordinates of a curve are *variable* quantities, because they vary or change their magnitudes together, and in passing from one point to another their values increase or diminish according to the law of the curve. See *Calculus* (in mathematical sense).

Variable Stars, stars which undergo a periodical increase and diminution of their lustre.

Varicose Veins, veins in a diseased state, which become dilated and uneven, and form hard knotty swellings in the situation of their valves. The disease is a common affection of the lower limbs, where sometimes the varix bursts and hæmorrhage takes place. It also occurs in the veins of the scrotum and lower rectum, producing in the latter case bleeding piles. Varicose veins are caused by local obstruction of the circulation of the blood, and are common in pregnancy, while stout people, and those who stand most of the day at work, are apt to suffer from them. The treatment consists in the application of proper bandages, and rest to the limb supported in an elevated position.

Variety, in scientific classifications, a subdivision of a species of animals or plants; an individual or group of individuals differing from the rest of the species to which it belongs in some accidental circumstances which are not essential to the species. Varieties are considered as less permanent than species, and those naturalists who look upon species as strictly distinct in their origin, consider varieties as modifications of them arising from particular causes, as climate, nourishment, cultivation, and the like. See *Species*.

Varna, a fortified town of Bulgaria (of which it is the chief port), on the Black Sea. It has a good harbour, and a large trade with Constantinople in grain. It is the see of a Greek archbishop. It was taken by the Russians in 1828, but restored to Turkey a year later by the Peace of Adrianople. The Crimean expedition sailed from Varna in 1854. Pop. 37,400.

Varnhagen von Ense, KARL AUGUST, German biographer, born at Düsseldorf 1785, died at Berlin 1858. He had a considerable military experience in his younger days, and was latterly engaged in the Prussian diplomatic service. Among his chief works are *Biographische Denkmale, Denkwürdigkeiten und Vermischte Schriften, Tagebücher, and Lives of Von Seydlitz, Sophia Charlotte, Marshal Keith, &c.*

Varnish, a solution of resinous matter, forming a clear, limpid fluid, capable of hardening without losing its transparency, and used by painters, gilders, cabinet-makers, &c., for coating over the surface of their work, in order to give it a shining, transparent, and hard surface, capable of resisting in a greater or less degree the influences of air and moisture. The resinous substances most commonly employed for varnishes are mastic, sandarac, lac, copal, amber, and asphalt; and the solvents are fixed oil, volatile oil, and alcohol. Varnishes are coloured with arnotto, gamboge, saffron, dragon's-blood, &c. Fixed-oil varnishes are the most durable, and are the best adapted for exposure to the weather. Volatile-oil varnishes consist of a solution of resin in oil of turpentine. They are chiefly used for paintings.

Varro, MARCUS TERENCE, one of the most learned men and prolific writers of ancient Rome, born B.C. 116, served in the army, and subsequently filled several public offices. Varro was the intimate friend of Cicero, and was proscribed by Antony, but he escaped and returned to Rome under Augustus, and died there in B.C. 27. Of his numerous writings, chiefly on language, history, and philosophy, only one has come down to us entire—a treatise upon agriculture (*De Re Rustica*). Fragments of a treatise on the Latin language (*De Lingua Latina*) are also extant.

Varuna, in Hindu mythology, the god of water, the cause of rain, lord of rivers and the sea, the Hindu Neptune or Poseidon indeed. His name corresponds with Greek Ourānos (Urānus), and meant origi-

nally the sky or heavens. He is represented as a white man, four-armed, riding on a sea



Varuna, the Indian God of Waters.

animal, generally with a noose in one of his hands and a club in another.

Varus, PUBLIUS QUINTILIUS, a Roman general, celebrated in consequence of the great defeat that he suffered at the hands of Arminius, leader of the Germans. In 7 B.C., having received from Augustus the command to introduce the Roman jurisdiction into the German territory just conquered by Drusus, he was carrying out his mission when he was suddenly attacked by an immense host under Arminius, and his whole army was destroyed. Varus put an end to his own life. The exact scene of this battle is disputed. See *Arminius*.

Vasa, GUSTAVUS. See *Gustavus I.*

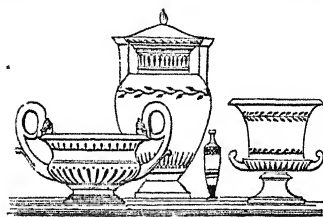
Vasari, GIORGIO, Italian painter and architect, but most distinguished as the biographer of artists, was born at Arezzo, in Tuscany, in 1512, and studied under Luca Signorelli, Michael Angelo, and Andrea del Sarto. As an architect he showed great ability, as exemplified in his designs of the Palazzo degli Uffizi at Florence, and the church of Abbazia at Arezzo. As a painter he was less successful. His principal paintings are a Lord's Supper, in the cathedral of Arezzo, several works in the Palazzo Vecchio in Florence, and in the Vatican in Rome. His *Vite de' più eccellenti Pittori, Scultori ed Architetti* (Lives of the Most Excellent Painters, Sculptors, and Architects) is of great interest, but it exhibits many errors respecting the earlier masters; and it is also guilty of partiality towards the Tuscan artists. It was first printed in 1550, and an enlarged and improved edition appeared in 1568. It has been translated into English. Vasari died in 1574.

Vasco da Gama. See *Gama*.

Vascula'res, or **VASCULAR PLANTS**, a name given to the great division of plants, consisting of those in which vascular tissue appears, and thus including all the phanerogamous plants, both exogenous and endogenous. See *Cellularcs*.

Vascular Tissue, in plants, consists of elongated ducts or cells, which may have closed extremities, so that fluids pass from one cell to another through the partition walls, or these partitions may be partly obliterated, thus forming a continuous tube. See *Botany*.

Vase, a name applied to certain vessels of an ornamental character. Vases were made in ancient times of all materials, but those which have come down to us in greatest



Grecian Vases.



Chinese, Japanese, and Indian Vases.

numbers are the so-called Etruscan vases, made of terra cotta, and adorned with painted figures. (See *Etruscan Vases*.) Such vases have been found in most Greek cities as well as in Etruria, and all are really the productions of Greek art. The Greek vases of the oldest style mostly come from Corinth and the islands of Thera and Melos; and those of the late rich style have been almost exclusively discovered in Lower Italy (Apulia and Lucania), and were probably manufactured there, chiefly in the 4th and 3d centuries B.C. Vases were used for all purposes, but one peculiar and very common application of them was to adorn sepulchres.

Chased metal vases were in use in ancient times both among the Greeks and Romans, and many of the more valuable and beautiful kinds of stone were also used for making vases. Murrine vases (which see) were highly esteemed at Rome. Another favourite kind of vases at Rome was that called cameo vases, made of two layers of glass, the outer of which was opaque, and was cut down so as to leave figures standing out upon the lower layer as a ground. The celebrated Portland vase is an example of this kind. At a later period glass vases surrounded with delicate filagree work were introduced. Italy, France, and Germany in the 16th and 17th centuries produced many vases which are the perfection of artistic form and execution, and since the 15th century many master-pieces of the glass art in the form of vases have issued from the Venetian manufactories. From India, China, and Japan also have been obtained vases of various materials, especially of porcelain, vying in elegance of form and beauty of ornamentation with those produced in Europe.

Vas'eline, a semi-solid, greasy product, usually of a yellow colour, obtained from the higher fractions in the distillation of crude petroleum. It consists of a mixture of hydrocarbons, and is used as a base for ointments, pomades, cold-cream, &c., and for coating surgical instruments and steel surfaces generally to protect them from rust.

Vassal. See *Feudal System*.

Vassar College, a university at Poughkeepsie, New York, founded by Matthew Vassar in 1861 for the higher education of women, opened in 1865—the first properly-equipped institution of the kind and now possessing large endowment funds. It confers the degrees of B.A. and M.A., and the course of studies resembles those of other first-class colleges.

Vateria, a genus of plants, natural order Dipterocarpaceæ. Two species, *V. indica* and *V. lanceafolia*, belong to India, forming large trees, valuable both for their timber, and also for the products which they yield. *V. indica*, whose timber is much employed in ship-building, produces the resin called in India *copal* and in England *gum anime*. It also yields a fatty substance called *piney-tallow*.

Vathi, or **VATHY**. See *Ithaca*.

Vat'ican, the most extensive palace of modern Rome, the residence of the pope, built upon the Vatican Hill, from which it has received its name, on the opposite side

of the river from the bulk of the city, immediately to the north of the cathedral of St. Peter's. It is a long rectangular edifice lying north and south, with an irregular cluster of buildings at either end. The present building was begun by Pope Eugenius III. (1145-53), and has been enlarged and embellished by many subsequent popes down to the last one (Pius IX.). It now possesses twenty courts, and, it is said, 11,000 rooms of one sort or another. Immense treasures are stored up in it. Here are celebrated collections of pictures of many of the great masters, and museums in which all periods of the arts are represented by many of their most perfect productions. Among its noblest art treasures are the frescoes on the ceiling of the Sistine Chapel, painted by Michael Angelo, and consisting of scenes and figures connected with sacred history; and the frescoes painted by Raphael on the ceilings and walls of certain apartments known as Raphael's *stanze*, the subjects being biblical, allegorical, &c. Since the return of the popes from Avignon, the Vatican has been their principal residence, and here the conclaves always meet for the election of new popes. The *Vatican Library* was first constituted by Pope Nicholas V. (1447-55), and was added to and enlarged by Leo X., Pius IV., Pius V., and other popes. The most important part of the library is the manuscript collection, which is said to contain about 25,600 MSS. The number of printed volumes has been estimated at from 150,000 to 220,000, including 2500 15th-century editions, and a great number of bibliographical rarities.

Vatican Codex. See *Codex*.

Vatican Council, the Ecumenical Council of the Church of Rome which met in the Vatican in 1870, and declared the infallibility of the pope, speaking as pope, a dogma of the church. See *Infallibility*.

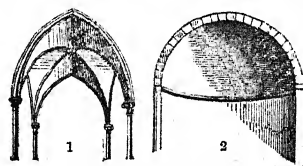
Vauban, SÉBASTIEN LE PRESTRE, SEIGNEUR DE, Marshal of France, and the greatest military engineer of that country, descended of an ancient and noble family, was born 1633, and early entered the army, where he rose to the highest military rank by his merit and services. He was made governor of the citadel of Lille in 1668, commissioner-general of fortifications in 1677, and marshal of France in 1703. He died at Paris in 1707. As an engineer he carried the art of fortification to a degree of perfection unknown before his time. He strengthened and improved above 300 citadels, erected thirty-

three new ones, and directed fifty-three sieges.

Vaucluse (vō-klüz), a department in the south-east of France; area, 1370 sq. miles. It is rugged and mountainous in the east, but more than one-half of the whole surface is arable, and vineyards occupy about one-sixth of this portion. The mulberry (for the rearing of silk-worms) and olive are extensively cultivated, and much attention is paid to the culture of aromatic and medicinal plants. Vaucluse takes its name from the valley and village of that name, rendered celebrated by Petrarch. Avignon is the capital. Pop. 236,949.

Vaud, or PAYS-DE-VAUD (pe-ē-dé-vō; German, *Waadt* or *Waadtland*), a western canton of Switzerland; area, 1244 sq. miles. It has three mountain systems—the Alps in the south-east, the Jura in the west, and the Jorat in the south; and partly embraces the lakes of Geneva and Neuchâtel, belonging both to the basins of the Rhine and the Rhone. The soil is moderately fertile; and the vine is extensively cultivated in the south. There are no manufactures of importance. The inhabitants are mostly Protestants. Vaud became a canton of the Swiss Confederation in 1803. The capital is Lausanne. Pop. 231,379.

Vault, in architecture, a continued arch, or an arched roof, so constructed that the stones, bricks, or other material of which



1, Gothic groined vault. 2, Spherical or domical vault.

it is composed, sustain and keep each other in their places. Vaults are of various kinds, cylindrical, elliptical, single, double, cross, diagonal, Gothic, &c.

Vauxhall Gardens, formerly a fashionable place of entertainment in London, situated near the Thames, in the parish of Lambeth. Their site is now built over.

Vector. See *Radius Vector*.

Vedanta Philosophy, a system of Brahmanic philosophy, first set forth in a work called the *Vedānta*, said to have been written more than two thousand years ago, and described as containing the quintessence of the Vedas. This system is based, like that

of the Eleatics among the Greeks, upon the unity of all real existence. The sole real existence is denominated knowledge (*jñāna*), soul, or God. The multiplicity of individual life and variety of external life in the universe is merely phenomenal, and has all proceeded from the one real being by the exercise of the power of ignorance (*ajñāna*), which may be vanquished by a religious and ascetic mode of life, or by meditation on the one supreme spirit, Brahma, and by the extinction of all consciousness of outward things.

Vedas (from the Sanskrit root *vid*, meaning 'know'), the oldest of the Shastras or sacred writings of the Brahmans, and the oldest compositions in the Sanskrit language. Their date is unknown. Sir W. Jones fixes it at 1500 B.C., and Ritter at 1400 to 1600 B.C. They are four in number, called respectively the Rīg, Yajur, Sāma, and Atharva Veda. All the Vedas are believed to be inspired, and are held by the Brahmans in the highest respect. The religious system of the Vedas is at bottom monotheistic. It derives a polytheistic appearance from the mention of the deity by various names according to the difference of his manifestations and attributes (Sūrya, Mitra, &c., the sun; Soma, the moon; Agni, fire; Indra, the firmament, &c.); but the unity of the supreme being is expressly asserted in more than one passage. Each of the Vedas is divided into three parts: the first called the *Sanhitā*, a collection of hymns and prayers called *mantras* or *gānas*; the second, *Brāhmaṇa*, which relates chiefly to ritual; and the third, the *Jñāna* or Upanishads, which is the philosophical portion of the work. The Upanishads are sometimes called collectively the *Vedānta*. The Rīg-veda is the oldest of the Vedas, and the Atharva-veda the latest. Some scholars question whether the latter should be regarded as a Veda. Varying greatly in age, the Vedas represent many stages of thought and worship, the earliest being the simplest, the later following and reflecting the development of the Brahmanical system, with all its superstitions and rites.

Veddahs, a wild, semi-savage race, about 400 in number, residing in the interior of Ceylon, and said to be a remnant of the aborigines of Ceylon. The forest Veddahs live in trees and caves and subsist on game, which they kill with rude bows and arrows. The village Veddahs dwell in certain districts, but hold slight intercourse with the

other inhabitants. The two tribes do not intermarry, and they have their own chiefs whom they elect and obey.

Vega Carpio, FELIX LOPE DE, a Spanish poet and dramatist, born at Madrid in 1562 of poor but noble parents; died there in 1635. After studying at Alcalá he became the secretary of the Duke of Alva. In 1582 he joined the army, and in 1588 accompanied the Invincible Armada. After being twice married and twice a widower, he in 1609 became a priest, and subsequently entered the order of St. Francis. He had already published various poems, but his dramatic and poetical productions were now multiplied with extraordinary rapidity. He enjoyed an immense popularity, and received marks of distinction from the King of Spain and Pope Urban VIII. About three hundred of his dramatic works have been printed. They reveal an inexhaustible but ill-regulated imagination, a strong mixture of the sublime and the ridiculous, and extraordinary facility in versification. He wrote altogether upwards of eighteen hundred comedies, but only some four hundred and fifty are extant in print or MS.

Vegetable Chemistry, the department of organic chemistry which investigates the chemical compounds found in vegetables. These compounds are chiefly made up of carbon, hydrogen, oxygen, and nitrogen, but potash, soda, lime, and other substances are occasionally present in small and variable quantities. Sugar, starch, gum, and other distinct compounds existing already formed in plants, and capable of separation without suffering decomposition, are called *proximate* or *immediate principles* of vegetables. *Proximate analysis* is the separation of a particular principle from others with which it is mixed. *Ultimate analysis* consists in the reduction of the proximate principles to their simplest parts. The more important classes of compounds to be obtained from vegetables are acids, alkalis or alkaloids, oils, and resins. Colouring matter, tannin, albumen, gluten, yeast, and other substances are also obtained. Of the acids the chief are acetic acid or vinegar, oxalic, tartaric, and benzoic acids. The alkaloids are organic bases which produce remarkable toxicological effects. During the germination of seeds there is a conversion of starchy matter into sugar. The nutrition of plants may be regarded as depending upon solar energy, organic and mineral constituents, and water. See *Botany*.

Vegetable Ivory, the name which is applied to the kernels of the nuts (*corozo-nuts*) produced by the *Phytelphas macrocarpa*, a palm growing in South America. It is very hard and compact, has the appearance of ivory, and may be turned in the lathe, being used for buttons, umbrella handles, &c. The stem of the palm is extremely short, but the leaves rise to the height of 30 or 40 feet.

Vegetable Marrow, a species of gourd cultivated as a culinary vegetable, and used fried, boiled, or otherwise.

Vegetarianism, the theory and practice of living solely on vegetables. The doctrines and practice of vegetarianism are as old as the time of Pythagoras, and have for ages been strictly observed by many of the Hindus; and of late years the practice of subsisting solely upon vegetable food—or at least of rejecting flesh food—has been brought prominently before the public.

Vehme. See *Fengerichte*.

Veil (vé'yí). See *Camillus* and *Rome*.

Vein, in mining, a crack or fissure in a rock, filled up by substances different from the rock, and which may either be metallic or non-metallic. Veins are sometimes many yards wide, having a length of many miles, and they ramify into innumerable smaller parts, often as slender as threads. Metallic veins are chiefly found in the primary, and lower and middle secondary rocks.

Veins, a system of membranous canals or tubes distributed throughout the bodies of animals for the purpose of returning the impure blood to the heart and lungs, after it has been conveyed to the various parts by the arteries. They are not elastic and have no pulsation (thus differing from the arteries), the motion of the blood in them being mainly secured by pressure of the moving parts between which they are embedded, the backward flow of the blood being prevented where necessary by a series of valves which permit a current only towards the heart. The veins at their farthest extremities form capillaries which collect from the tissues the blood brought by the arterial capillaries. These minute branches unite to form veins, which similarly unite in turn, forming gradually larger branches and trunks as they approach the heart. The venous blood from the head, neck, and upper limbs is all returned to the heart by one great vein, the *vena cava superior*, while that from the lower limbs and belly is returned by the *vena cava inferior*. The portal vein (*vena portæ*) receives the venous blood

from the intestines and conveys it through the liver to the *vena cava inferior*. From each lung to the heart come two pulmonary veins carrying back the blood that has been purified in the lungs, after being carried to them by the pulmonary artery. See *Heart*.

Velasquez (ve-lás'keth), or in full DON DIEGO RODRIGUEZ DE SILVA Y VELASQUEZ (or VELAZQUEZ), an eminent Spanish historical and portrait painter, was born at Seville in 1599. He studied first under Francisco Herrera the elder, and afterwards under Francisco Pacheco. He was appointed principal painter to Philip IV. in 1623. In 1629 he went to Italy, where he closely studied the works of Michael Angelo, Raphael, and Titian. On his return to Spain in 1631 he was received with great distinction, and in 1658 the king raised him to the dignity of a noble. He died in 1660. His compositions exhibit strong expression, freedom of pencil, and admirable colouring. Among his best works are the *Aguador*, or *Water-carrier*; the *Orlando Muerto*; a *Nativity*, or *Adoration of the Shepherds*; the *Brothers of Joseph*; *Moses taken from the Nile*; portraits of Philip IV. and of Elizabeth his queen, Pope Innocent X., and other dignitaries; and many pictures from history and from common life.

Vel'de, ADRIAN VAN DER, a celebrated Dutch landscape painter and engraver, was born at Amsterdam in 1635, and died in 1672. He came under the influence of Wouverman, and excelled in pastoral scenes, which he executed in admirable drawing and colour. He also painted some large historical and religious pieces, and etched a number of plates.—His father, WILLEM VAN DER VELDE the Elder, was born at Leyden in 1610. He was originally bred to the sea, but afterwards studied painting, and early became distinguished for his excellence in marine subjects. Both he and his son entered the service of Charles II. He chiefly painted in black and white, and is said to have been present at several sea-fights in order to sketch the incidents. He died at London in 1693.—His son, WILLEM VAN DER VELDE the Younger, was born at Amsterdam in 1633, and painted the same class of subjects as his father, whom he surpassed. His principal works are chiefly to be found in the royal collections and cabinets of England. He died at London in 1707.

Velella, a curious genus of coelenterate animals, of the class Hydrozoa, order Phy-

sophoridæ, and represented by free-swimming oceanic forms, which occur around the British coasts, but more frequently in warm seas. The best-known member, *Vella vulgaria*, or 'Sallee Man', is about 2 inches in length by $1\frac{1}{2}$ in height. It is of a beautiful blue colour and semi-transparent, and floats on the surface of the sea with its vertical crest exposed to the wind as a sail.

Velez-Málaga, an ancient city of Spain, in Andalusia, province of Málaga, on the Velez, $1\frac{1}{2}$ mile from the Mediterranean, and 14 east by north of Málaga. The district is very fertile, and produces sugar-cane, the olive, sweet-potato, maize, &c. Its port is the suburb Torre del Mar, a bathing-place in summer. Pop. 24,332.

Vell'no, a small stream of Central Italy, a tributary of the Nera, at its junction with which it forms beautiful falls about 650 feet high. See *Terni*.

Velleus Paterculus. See *Paterculus*.

Velletri (vel-lä'trè), a town in Italy, prov. of Rome, 21 miles south-east of Rome. The chief buildings are the cathedral, a handsome Gothic structure rebuilt in 1660; the town-hall, built from the designs of Bramante; and the palaces Lancellotti or Ginetti, and Borgia. Velletri, the ancient *Velitra*, is of early origin, having been a town of the Volsci centuries before the Christian era. Pop. 14,600.

Vellore (vel-lör'), a town and fort of India, presidency of Madras, district of North Arcot, on the Palár river. The town has a Vishnuite temple, mosque, military offices, church, missions, a hospital, barracks, &c. Pop. 43,537.

Vellum. See *Parchment*.

Velocipede. See *Cycle*, *Bicycle*, *Tricycle*.

Velocity, the rate at which a body changes its position in space, commonly expressed by the time it takes to traverse a certain space. The term is also applied to the speed or rapidity with which certain forces, undulations, &c., are propagated, as in the case of light or electricity. The velocity of a body is *uniform* when it passes through equal spaces in equal times, *variable* when the spaces passed through in equal times are unequal, *accelerated* when it passes through a greater space in equal successive portions of time, as is the case of falling bodies under the action of gravity, and *retarded* when a less space is passed through in each successive portion of time. *Angular velocity* is such a velocity as that of the spoke of a wheel, being measured as a number of

angles of a specified extent (as right angles) divided by a measure of time in specified units. See *Acceleration*, *Fall of Bodies*, *Dynamics*, *Gravity*, *Motion*, &c.

Velvet, a rich silk stuff, covered on the outside with a close, short, fine, soft shag or nap. In this fabric the warp is passed over wires so as to make a row of loops which project from the backing, and are thus left, by withdrawing the wire, for an uncut or *pile* velvet, but are cut with a sharp tool to make a *cut* velvet. Florence and Genoa have been long noted for the manufacture of velvet, but Lyons, in France, is now its principal seat. Krefeld and Elberfeld are seats of its manufacture in Germany. Cotton and woollen fabrics woven in this manner are called *velveteen* and *plush* respectively.

Vendace, a species of fishes, of the family Salmonidæ, genus *Coregonus* (*C. Willoughbi*), found in Britain only in Lochmaben, and in two or three of the English lakes, and on the Continent in some of the rivers and lakes of Sweden. The average length is about 6 to 7 inches. The upper parts are of a greenish-brown colour, the under parts silvery. The fish is esteemed a great delicacy, and is taken with the sweep-net about August.

Vendée (vân-dâ), a western maritime department of France; area, 2595 sq. miles. The surface is much diversified, and is watered in the north by tributaries of the Loire, and in the south by the Vendée, Lay, and tributaries of the Charente. The principal crops are grain, potatoes, beet, and hemp; and a white wine is also produced. Capital, La Roche-sur-Yon. At the time of the revolution the Vendéans espoused the royalist cause, and, inspired by La Rochejaquelein, Cathelineau, and other leaders, and aided by the hilly and wooded nature of the ground, they resisted the republicans with varied success from 1793 to 1796, when the rising was completely quelled by the activity of General Hoche. In 1799-1800, and again in 1814 and 1815, some risings took place in favour of the Bourbons, but they were quickly suppressed. Pop. 441,811. See *Chouans* and *La Rochejaquelein*.

Vendémiaire (vân-dâ-mê-är; that is, 'vintage month'), the first month in the French revolutionary calendar, from 22nd Sept. to 21st Oct. See *Calendar*.

Vendetta (Italian word from *L. vindicta*, revenge), a blood-feud; the practice of the

nearest of kin executing vengeance on the murderer of a relative. In Corsica the vendetta is regarded as a duty incumbent on the relatives of the murdered man, and, failing to reach the real murderer, they take vengeance on his relatives. The practice exists, although to a more limited extent, in Sicily, Sardinia, and Calabria, as well as among the Druses, Circassians, Arabs, &c.

Vendôme (vân-dôm), a town of France, in the department of Loir-et-Cher, on the Loir. It is regularly and well built, and contains a fine old church. Pop. 7038.

Vendôme, LOUIS, DUKE OF, the celebrated general of Louis XIV., was the grandson of César, eldest son of Henry IV. and Gabrielle d'Estrées. He was born in 1654, early entered the military service, and received, in 1702, the command of the French army in the war of the Spanish Succession. After having distinguished himself in Italy, Tyrol, and Belgium, the Duke of Burgundy was placed over him; and the disagreement of the two commanders caused the defeat of the French at Oudenarde (July 11, 1708). Vendôme was recalled. Soon after being placed in command in Spain he gained several distinguished successes, but died in 1712. His brother Philip was grand prior of the order of the Knights of Malta in France. He was born in 1655, served in the Spanish war of Succession, and died in 1724.

Veneer, a thin layer of choice hard wood, such as mahogany, rosewood, maple, &c., glued to the surface of wood of a commoner sort, such as fir or pine, so as to give the whole the appearance of being made of the more valuable material. It is mostly used for furniture, and owing to recent improvements in sawing machinery, layers as thin as paper can be obtained.

Venesection. See *Phlebotomy*.

Venetian Architecture, **VENETIAN GOTHIC**, that style of Italian architecture employed by the Venetian architects from the 15th to the early part of the 17th century. The principal characteristics are: each story is provided with its own tier of columns or pilasters, with their entablature, and separated from the other stories by conspicuous friezes or belts, often in the form of balustrades broken by pedestals and ornamented by figures; arched windows ornamented with columns, the spandrels being often filled with figures; ornamental parapets are common; and the whole has a rich and varied effect. This style of architecture is characterized by Fergusson as 'Gothic treated

with an Eastern feeling, and enriched with many details borrowed from Eastern styles.'

Venetian School, in painting, that school which counts among its masters Titian, Paul Veronese, Giorgione, Tintoretto, and many other illustrious names. See *Painting*.

Venezuela (ven-es-wá'lá), a northern republic of South America, bounded by the Caribbean Sea, the Atlantic, British Guiana, and the republics of Brazil and Colombia; area, about 365,000 sq. miles. The Andes enter Venezuela from the west in two branches; the western branch has a moderate elevation, rarely exceeding 4000 feet, but the eastern branch, which is about 300 miles long by 60 miles broad, has an average altitude of 12,000 feet, culminating in Sierra Nevada de Merida with summits attaining 15,000 feet. There are other branches running north-east and parallel to the north coast, and in the south, on the frontiers of Guiana, are the mountains of Parima. From these mountains to the coast chain at Carácas, and from the Andes to the mouth of the Orinoco, extend vast plains (or llanos) with an area of 300,000 sq. miles. The chief rivers are the Orinoco and its affluents; the principal lakes are Maracaybo and Tacarigua. The climate is equatorial in character, and the seasons are distinguished into the wet and the dry. It is not unhealthy on the whole. The greater part of Venezuela is liable to earthquakes. The valleys and table-lands of the coast mountains are the chief seats of cultivation. The region of palms extends from the sea-level to the height of 3300 feet; mingled with the palms are cacti, mimosa, the pineapple, the milk-tree, mahogany, and trees yielding caoutchouc, sarsaparilla, copaiba, and other drugs. Above 2000 feet are the forests of cinchona or Peruvian-bark tree, the vanilla, plantain, &c. All the grains of temperate regions attain perfection at an elevation of 8000 feet. The chief vegetable products are coffee, cocoa, sugar, cotton, maize, cinchona, rubber, vanilla, &c. Among the minerals are gold, silver, copper, iron, tin, lead, and sulphur; good coal is found in the coast districts; asphalt and petroleum abound round Lake Maracaybo. The gold mines are now being worked by English and other capital. The wild animals include the jaguar (now rare), puma, tapir, ounce, monkeys, serpents, alligators, the manatee, &c. The population is of Spanish, Indian, and Negro origin, either of pure or mixed blood. More than half the population are mestizoes, mulattoes, and other

VENICE.

mixed breeds. The chief exports are coffee, cocoa, hides and skins, cattle, dye-woods, gold, and copper ores. The imports are chiefly manufactured goods, machinery, &c. The annual value of exports is about £1,600,000. Accounts are kept in *bolivars*, each equal to a franc. Venezuela is divided into states and territories, each state being self-governing. The legislature of the republic consists in a congress of two houses, at the head being a president. The republic was formed in 1831 by secession from Colombia. (See *Colombia*.) It has suffered greatly from intestine dissensions, and has also had boundary and other disputes. The British Guiana frontier was determined by arbitration in 1899; claims by Britain, Germany, &c., were decided at the Hague in 1903. The capital is Carácas. The chief ports are La Guayra, Puerto-Cabello, Maracaybo, and Ciudad Bolívar. There are about 530 miles of railway. Pop. 2,500,000.

Ven'ice (Italian, *Venezia*), a city and seaport of Northern Italy, capital of the province of the same name, on a number of islets in a shallow lagoon in the north-west of the Adriatic, 23 miles east of Padua by rail. The islets are very low, and the houses are mostly supported on piles. A railway viaduct nearly 2½ miles long connects the town with the mainland. The city is divided into two parts by the Canalazzo or Grand Canal, spanned by an elegant bridge, the Rialto, and several lesser bridges. The numerous branch canals are crossed by about 380 bridges, which rise rapidly towards the centre to afford passage to the gondolas and other boats. The city is also intersected by *calli* or narrow lanes for pedestrians; but the canals are really the streets of Venice, and it possesses neither horses nor wheeled carriages. Near the centre of the city there is one street about 18 feet wide, the Merceria, but the great centre of business and amusement is the Piazza, or Square of St. Mark, and the piazzetta adjoining it. The Piazza is about 570 feet long by 200 broad, contains some of the more remarkable public buildings, and is lined with handsome shops and cafés. The piazzetta faces the sea. The Palace of the Doges, reconstructed by Marino Falieri in 1354, abuts on the piazzetta. It is in the Venetian Gothic style, and has two of the sides resting on double ranges of arcades. It contains a number of beautiful halls, some with ceilings and walls painted by Tintoretto, Paolo Veronese, and other distinguished masters. The Ponte-dei-

Sospiri (Bridge of Sighs) connects the palace with the public prisons on the opposite side of a narrow canal. The church of St. Mark, now the cathedral (erected 976-1071), is in the Romanesque-Byzantine style, and is surmounted by five domes. The principal front is adorned with 500 columns of



precious marbles, and the interior is lavishly decorated. Above the doorway are the four celebrated bronze horses brought from Constantinople by the Doge Dandolo in 1204. Other notable churches are Santa-Maria-Gloriosa-de-Frari (13th century), containing the tomb of Titian, and numerous works of art; and San Giovanni-e-Paolo, a splendid Gothic domed building. Of the numerous palaces among the chief are the Palazzo-Reale (royal palace and library); Palazzo-Ducale (the palace of the doges), with a library and many paintings; and the Palazzo-Corner-della-Cà-Grande, the seat of municipal authorities. The remaining public buildings include the Accademia delle Belle Arti, containing works by Titian, Giorgione, Tintoretto, Paolo Veronese, and others; the Dogano, or custom-house; the arsenal; the Zecca, or mint; &c. The chief manufactures are woollen cloth, cloth of gold and silver, velvet, lace, ornamental and coloured glass, mosaic, jewelry, castings, &c. The trade is extensive; the imports include colonial goods, dye-woods, coal, iron, oil, &c.; exports timber, rice, linen, glass, coral, &c. The harbour is spacious, but the entrances are shallow.—Venice is supposed to have been founded in the 5th century by inhabitants of the surrounding districts, who took

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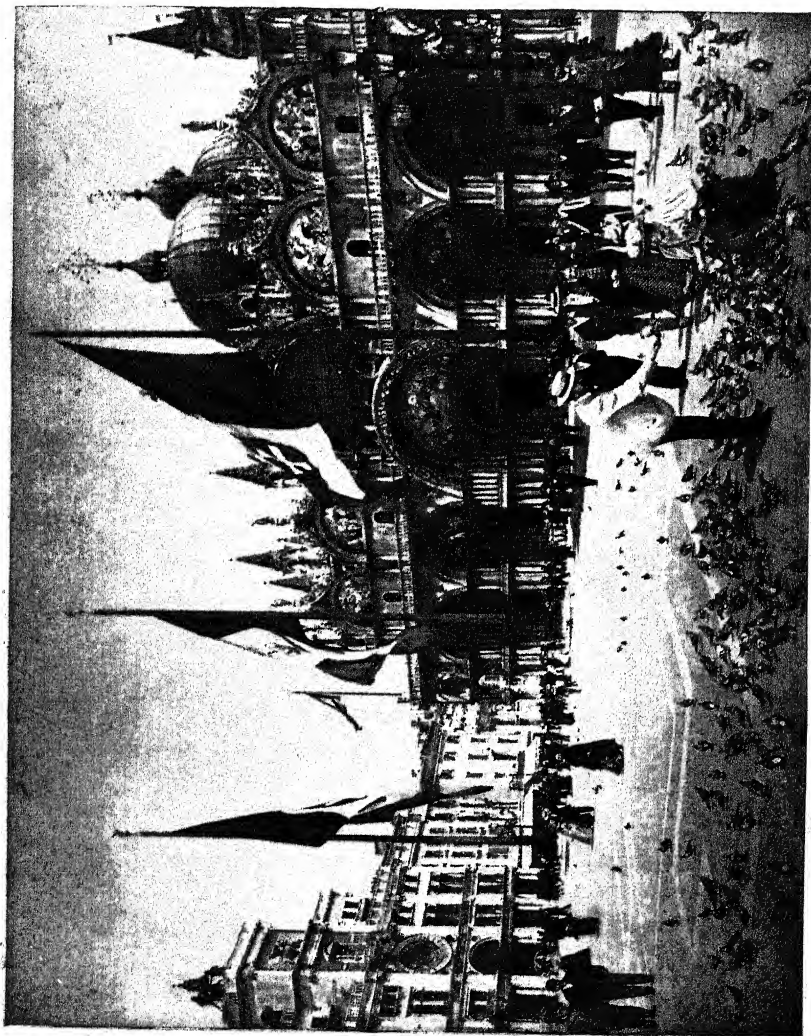


Photo. Photochrom Co. Ltd.

VENICE: PIAZZA AND CATHEDRAL OF ST. MARK

refuge from the cruelty of Attila on the islets at the mouth of the Brenta. In 697 Pauluccio Anafesto was elected the first doge or duke, and in 819 the seat of government was removed from Malamocco to Rivoalto (Rialto), and the adjacent islands were connected by bridges. The Crusades (1096-1271) greatly increased the wealth and power of the Venetians by giving employment to their shipping. In 1204 the Doge Enrico Dandolo conquered Constantinople, and upon the division of the Byzantine Empire Venice received a large accession of territory. Under Dandolo's successors the Venetians gradually lost all their mainland possessions. But in 1386 they captured Corfu, Durazzo, Argos, &c.; in 1405 their general, Malatesta, conquered Vicenza, Belluno, Verona, and Padua; and besides these and other conquests on land, the Venetian fleet defeated the Turkish fleet at Gallipoli in 1416, and in 1421 subjugated all the towns along the Dalmatian coast. At the close of the 15th century Venice had a population of 200,000, and was the centre of the entire commerce of Europe. Its power then began to decline, its commerce was gradually superseded by that of the Portuguese, and in 1503 a league to subdue the republic was formed at Cambrai between Pope Julius II., the Emperor of Germany, and the kings of France and Spain. All its possessions on the mainland were taken, and the work of destruction was all but completed by warfare with the Turks at intervals from 1649 to 1718. The French took possession of the city in 1797. It subsequently became part of the Austrian Empire, of Napoleon's kingdom of Italy, and from 1815 to 1866 of the Lombardo-Venetian Kingdom under Austria. In 1866 the city and province was ceded to Napoleon III., under whose auspices they were united by a plebiscite to the Kingdom of Italy. Pop. 151,841.

Venice, GULF OF. See *Adriatic Sea*.

Veni're facias (Latin, 'that you cause to come'), in law, a writ or precept directed to the sheriff, requiring him to *cause* a jury to *come* or appear in the neighbourhood where a cause is brought to issue to try the same. This writ was abolished in England in 1852, but the precept issued by the justices of assize, which is substituted, is sometimes loosely spoken of as a *venire*.

Venlo, a town of the Netherlands, province of Limburg, on the right bank of the Meuse. It has manufactures of needles and cigars. Pop. 15,000.

Venomous Animals, animals capable of inflicting poisonous wounds by means of special organs or contrivances. They include spiders, bees, wasps, hornets, scorpions, certain serpents, &c. In all cases the venomous matter must be introduced *directly* into the circulation to produce its effects.

Veno'sa (anc. *Venusia*), a town of Italy, province of Potenza. It has a cathedral, and a castle dating from the 15th century. Horace was born here. Pop. 8014.

Ventilation. See *Warning and Ventilation*.

Ventimiglia (-mél'yà), a town of Italy, province of Porto Maurizio, 7 miles east of Mentone. It is a bishop's see, and is surrounded by forts. Pop. 5000.

Ventnor, a watering-place of England, on the south-east shore of the Isle of Wight, in the district of Undercliff. It has many substantial and handsome houses, hospital, sea-side home, club-house, esplanade, pier, recreation ground, public gardens, &c. There is a good beach for bathing. Pop. 5866.

Ventose. See *Calendar*.

Ventricle. See *Heart*.

Ventriloquism, the art of speaking in such a way as to cause a hearer to believe that the sound comes, not from the person speaking, but from a different source. The name (Latin, *venter*, belly, and *loqui*, to speak) originated from the erroneous supposition that the sounds uttered were formed in the belly, whereas practice alone is necessary to carry this act of illusion to a high degree of perfection. The sounds are formed by the ordinary vocal organs—the larynx, the palate, the tongue, the lips, &c. The art of the ventriloquist consists merely in this:—After drawing a long breath he breathes it out slowly and gradually, dexterously modifying and diminishing the sound of the voice; besides this he moves his lips as little as possible, and by various contrivances diverts the attention of his auditors. This art was known to the ancient Greeks.

Ven'ue, in English law, the place, that is, the county, where an action is to be tried, and from whence juries are to be summoned for trial of causes. The venue, in all cases, civil and criminal, may be changed for sufficient cause.

Ve'nus, the Roman name of the goddess of love, called by the Greeks Aphrodite. In the *Iliad* she is described as the daughter of Zeus and Dione; but Hesiod represents

her as the offspring of Urānus, born among the foam (Greek, *aphros*) of the sea. She surpassed all other goddesses in beauty, and hence received the apple which was to be awarded to the most beautiful by Paris. She was the wife of Hephestos (Vulcan), but also bestowed her love on the gods Arēs (Mars), Dionysos (Bacchus), Hermes (Mercury), and Poseidon (Neptune), and the mortals Anchises and Adonis. Themyrtille, rose, poppy, apple, and other fruits were sacred to her, as were also the dove, sparrow, swan, swallow, ram, hare, and tortoise. The chief places of her worship in Greece were the islands of Cyprus and Cythera. In Rome several temples were erected to her under different names. In the best days of art this goddess was always represented draped, in later times nude. The scene of her arising from the sea was sculptured by Phidias on the base of the statue of Zeus at Olympia, and one of the most famous pictures of Apelles represented the same subject. The Venus of Capua and the Venus of Milo represent her as Venus Victrix, with one foot on a helmet and raising a shield. The Venus de' Medici is supposed to be a free copy of a statue of her by Praxiteles, which was celebrated above all her other statues in ancient times. Among modern statues of Venus, one of the most famous is that by Canova, which represents her as issuing from the bath.



Venus, antique statue in the British Museum

Venus, one of the inferior planets, having its orbit between Mercury and the earth, and the most brilliant of all the planetary bodies. From her alternate appearance in the morning and evening she was called by the ancients *Lucifer* and *Hesperus*, the morning and evening star. The mean distance of Venus from the sun is about 66,134,000 miles, her diameter 7510 miles, and her period of revolution round the sun about 224.7 mean solar days. Her volume is equal to about $\frac{1}{77}$ ths of the earth, but

her density being slightly greater her mass is actually equal to about $\frac{1}{77}$ ths of the earth. The period of rotation round her axis is the same as that of revolution round the sun. The axis of rotation is inclined to the ecliptic at about 75° . According to her various positions relatively to the sun and earth she exhibits phases like the moon. Like Mercury, Venus transits the face of the sun, but at longer intervals. The transits of Venus are of much more importance than those of Mercury, because, being nearer to us when in transit, her position on the sun is measurably different for observers placed on different parts of the earth. See *Transit*.

Venus's Fly-trap. See *Dionaea*.

Vera-cruz (*vā'rā-krōs*), the chief seaport of Mexico, situated in the state of the same name. The harbour accommodation, though extensive works have been recently carried out, is still unsatisfactory, but there is a large trade, coffee, sugar, hides and skins, tobacco, &c., being exported. The town has broad and regular streets, and some good buildings; but is very unhealthy. It was founded by Cortez in 1520. Pop. 30,000. — The state stretches along the south-west of the Gulf of Mexico; area, 26,225 sq. miles. The products embrace grain, tobacco, sugar, cotton, fruits, dyewoods, and timber. Cattle, horses, and sheep are numerous. Pop. 980,000.

Verat'rin, or VERAT'RIA ($C_{27}H_{33}NO_{11}$), a vegetable alkaloid found in *Veratrum Sabadilla*, *Veratrum album*, &c. It is generally obtained as a crystalline powder, nearly white, very acrid and poisonous, insoluble in water, but very soluble in alcohol. In the form of tincture, and still more in that of ointment, veratrin is much used as an external application in cases of neuralgia and obstinate rheumatic pains. The smallest quantity entering the nose causes violent and even dangerous sneezing.

Verat'rum, a well-known genus of plants belonging to the natural order Melanthaceæ. *Veratrum album* (common white hellebore) is a native of most alpine meadows in the southern, central, and northern parts of Europe. It has large plaited leaves, erect stems, and large panicles of greenish flowers. It yields the substance veratrin (which see). Every part of both is acrid and poisonous, especially the rhizomes. The *V. viride* of North America (American hellebore) is an acrid emetic, and acts strongly in lowering the action of the heart.

Verb, in grammar, that part of speech whose essential function is to predicate or assert something in regard to something else (the subject or thing spoken of); as, the boy *runs*, the man *lifts* the stone, fishes *swim*, he *suffers* much. Verbs usually have the power of indicating time and mode by means of tenses and moods, these varying in the different languages, as does also the *conjugation* or system of verbal inflections and forms as a whole. They have been divided into *active* and *neuter verbs*, according as they predicate action or state. Active verbs are divided into *intransitive* and *transitive*, according as the action is confined to the actor or passes from him to an object. Intransitive verbs often take an objective of their own nature; as, he *runs* a race; he *sleeps* the sleep of death. When a verb may be used either transitively or intransitively, as, he *walks* the horse, he *walks* to church, the verb in the former use is said to be *causative*. Many causative verbs are distinguished from their corresponding intransitives by a change of form, as *sit, set; lie, lay; fall, fell*. *Passive verbs* affirm suffering or endurance of what another does. Hence, only verbs which take an object after them can have a passive voice, because it can be said of objects only that they suffer or endure the action directed on or towards them by the subject of the active verb. Passive verbs are thus the correlatives or complements of active verbs.

Verbascum. See *Mullein*.

Verbe'na, a genus of plants, the type of the natural order *Verbenaceae*. Most of the species are American; about seventy are enumerated. *V. officinalis* (common vervain), a plant common in England, and widely distributed, was once held in great repute for its medical virtues, and entered into the composition of various charms and love philters. Several species are cultivated for the great beauty of their flowers, being fine border plants. The verbenas of the perfumers is the lemon-grass, from which the 'oil of verbenas' is extracted.



Verbenas—Garden varieties.

Verbena'ceæ, a natural order of plants, consisting of trees, shrubs, and herbaceous plants common in the tropics of both hemispheres, but rare in Europe, Asia, and N. America. They have generally opposite or whorled simple or compound leaves without stipules; flowers in opposite corymbs, or spiked alternately, sometimes in dense heads, seldom axillary or solitary. The verbenas and teak are examples.

Vercelli (ver-chel'le), a town of North Italy, province of Novara, near the right bank of the Sesia, 44 miles w.s.w. of Milan by rail. It has a modern cathedral, a castle, now converted into courts of justice; hospital, cavalry barracks, &c., flourishing manufactures and trade. Pop. 25,000.

Verd-antique, in mineralogy, an aggregate of serpentine and white crystallized marble, having a greenish colour. It is beautifully mottled, takes a fine polish, and is much used for ornamental purposes. The term is also given to a green incrustation on ancient coins, brass or copper. *Oriental Verd-antique* is a green porphyry used as marble.

Verde, CAPE. See *Cape Verde*.

Verden (fär'dén), a town of Prussia, in Hanover, on the Aller, 21 miles s.e. of Bremen. It has a fine Gothic cathedral, a gymnasium, breweries, distilleries, and manufactures of cigars. Pop. 9842.

Verdi, GIUSEPPE, an Italian operatic composer, born in 1813. His first production was *Oberto*, Conte di San Bonifazio (1839), and in 1842 he brought out with great success at the La Scala, Milan, his *Nabucco*, followed by *I Lombardi* (1843), *Ernani* (1844), *Rigoletto* (1851), *Il Trovatore* (1853), *La Traviata* (1853), *Un Ballo in Maschera* (1859), *Aida* (1871), *Otello* (1886), and *Falstaff* (1893). Verdi has a fine dramatic gift, and his melodies are showy and taking. He was an Italian senator. He died in 1901.

Verdict. See *Jury*.

Ver'digris, a poisonous substance, prepared by exposing copper to the air in contact with acetic acid, and used as a pigment, as a mordant, in medicine, &c.

Ver'diter, a blue pigment prepared by dissolving verdigris in acetic acid.

Verdun, a town of France, department of the Meuse, 150 miles e.n.e. of Paris. It has a citadel, the work of Vauban, and is defended by 11 forts. The chief buildings are the episcopal palace, the barracks, and the public library. Verdun is famous for its liqueurs and confectionery, and it has

breweries, tanneries, dye-works, &c. It was taken by the Germans Nov. 9th, 1871. Pop. 21,000.

Vereshtchagin, WASILY, a Russian historical painter, born in 1842, and educated at the naval school in St. Petersburg. In 1864 he entered the École des Beaux Arts at Paris, where Gerôme was his master. He joined the Caucasian expedition under General Kaufmann in 1867, and in 1869 went to Siberia. In 1874 he went to India with the Prince of Wales, and afterwards settled in Paris. He took part in the Russo-Turkish war, and was wounded at Plevna. He afterwards visited all the chief cities of Europe exhibiting his pictures. They are of immense size, extremely realistic, and treat chiefly of the horrors of war. Latterly he took up religious subjects, and his Family of Jesus, and The Resurrection, attracted some attention. He lost his life at sea at Port Arthur in 1904.

Vergil. See *Virgil*.

Verjuice, a sharp vinegar made of the juice of the crab-apple. The sour juice of unripe grapes, used for culinary purposes, is also called *verjuice*.

Vermejo (ver-mā'hō), or RIO GRANDE, a river of the Argentine Republic, rises in the highlands of Bolivia, and flows in a general s.e. direction till it joins the Paraguay. It is 1300 miles in length, and has a very tortuous course.

Vermes (Lat. 'worms'), the sixth class of animals in the Linnæan arrangement of the animal kingdom, comprising all animals which could not be arranged under Vertebrata and Insecta.

Vermicelli (-chel'le; Ital. 'little worms'). See *Macaroni*.

Vermifuges. See *Anthelmintics*.

Vermil'ion, the name given to a pigment of a beautifully scarlet colour, obtained from crystallized mercuric sulphide. It is extensively employed in painting, in making red sealing-wax, and other purposes.

Vermont, one of the United States, bounded by Canada, New York, Massachusetts, and by Connecticut river; area, 9565 square miles. The surface is traversed from south to north by the Green Mountains (French, *Verts Monts*), which culminate in Mansfield Mountain in the n.w., 4280 feet high. The drainage is shared between Lake Champlain in the west, and the Connecticut and its affluents. The surface is generally fertile, grain growing in the valleys, while the higher lands furnish

excellent pasture. The climate is healthy, and the temperature ranges from 20° below zero in winter up to 90° in summer. Farming and grazing are the chief occupations, but there are increasing manufactures of cotton and woollen goods, leather, bar and pig iron, machinery, &c. The sugar-maple is abundant, and much sugar is made. There is a considerable internal and transit trade, but the foreign trade is limited, being chiefly carried on through New York and Massachusetts. Vermont was first settled by emigrants from Massachusetts, and joined the Union in 1791, after the state of New York had renounced a claim to the territory for £6000. Montpelier (pop. 6300) is the capital, but Burlington (pop. 18,600) is the largest town. Pop. 345,841.

Vernal Grass (*Anthoxanthum odoratum*), a sweet-scented British pasture grass, being that to which the odour of new-mown hay is chiefly due.

Verne (vern), JULES, a popular French romancer, born in 1828, died in 1905. He studied law, but afterwards began writing short pieces for the stage. In 1863 he published *Five Weeks in a Balloon*, and the vein of the marvellous, tinged with a quasi-scientific truthfulness, was henceforth worked by him with great success. His more popular works are: *Twenty Thousand Leagues under the Sea*, *From the Earth to the Moon*, *Across Africa in a Balloon*, and *To the Centre of the Earth*. Most of his works have been translated into English and German.

Vernet (ver-nā), JEAN ÉMILE HORACE, a French painter, grandson of Claude Joseph Vernet, a distinguished painter of sea-pieces and seaport scenes; and son of Antoine Charles Horace Vernet, painter of battle and genre pictures. He was born in Paris in 1789, and died in 1863. His first master in art was his father, and at an early age he acquired the favour of the imperial court by his battle-pieces, in which he adopted a realistic treatment in opposition to the classical school of David. His pictures connected with the wars of Napoleon are very numerous. In 1828 Charles X. appointed him director of the French Academy in Rome, a post he ably filled till the end of 1834, producing a series of pictures, partly historical, partly genre. Louis Philippe then commissioned him to paint galleries of the museum at Versailles with scenes relating to the conquest of Algeria, a country which he several times visited. In 1840 we find

him travelling in Egypt, Palestine, and Syria; in 1842 he accompanied the Emperor Nicholas on a journey from St. Petersburg to Sebastopol; and in 1845 he visited Spain and Algeria. In 1853 he followed the French army to Varna, but soon returned to Paris and produced his last great picture, *The Battle of the Alma*. His works include a certain number of pictures of biblical subjects, and also portraits.

Vernier, an index fitted to slide along the edge of a scale (as that of a barometer) and having divisions marked upon it, by means of which readings may be taken to small fractions of the parts actually marked on the scale. Suppose we have a scale of inches and tenths of an inch, and suppose the index is $\frac{3}{10}$ ths of an inch, and divided into 10 divisions. Suppose that in taking a reading the end of the index is past the 8 figure on the scale we write down 8, that it is past 3 of the tenth spaces and part of another we add '3, then looking up the index we find that its 6th division most nearly coincides with a division on the scale and we add '06, and so the position of the index is taken as marking 8'36 inches.

Verona, a city of Northern Italy, capital of the province of same name, beautifully situated on both sides of the rapid Adige, a fortress of the first class, walled, and entered by five beautiful gates. The town has some fine wide streets, and there are several elegant squares. Verona has a Roman amphitheatre, supposed to have been built about the 2d or 3d century of our era, the interior of which is nearly perfect; an imposing cathedral in the Gothic style dating from the 14th century, and many other magnificent churches rich in paintings and other art treasures. Other notable edifices are the Palazzo del Consiglio, adorned with statues of celebrated natives of the town; and the Gothic tombs of the Della Scala family (Scaligeri), who ruled Verona from 1262 to 1389. Modern public buildings include theatres, a museum, a library, hospitals, literary institutions, &c. The town has manufactures of silks, woollens, hats, &c., and a considerable trade. Verona was subject to the Romans in the 2d century B.C., and on the decline of the Roman Empire it was taken by the Goths, and became the capital of Theodoric's empire. In 774 it was captured by Charlemagne, and subsequently became an independent republic. Weary of the intestine dissensions of its nobles, it voluntarily ceded itself to

Venice, under which it remained from 1405 to 1797. It latterly belonged to the Austrians. Pop. 74,261.

Veronese (vā-ro-nā'ze), PAUL, the popular name of Paolo Cagliari, an eminent Italian artist, born at Verona in 1528. He studied painting under his uncle Antonio Badile, and worked successively in Venice, Rome, and other cities of Italy, but Venice was his chief residence. He was an excellent colourist, and was distinguished by the richness and fertility of his imagination. He was a contemporary of Titian and Tintoretto. He died at Venice April 19, 1588. His pictures are exceedingly numerous and varied in subject. Among his masterpieces are: *The Marriage at Cana* (now in the Louvre), *The Calling of St. Andrew to the Apostleship*, *The Rape of Europa*, *The Family of Darius at the Feet of Alexander*, *Adoration of the Magi*, *Consecration of St. Nicholas and St. Helena*, *The Vision of the Invention of the Cross*; the last five mentioned are in the National Gallery.

Veronica. See *Speedwell*.

Veronica, SAINT, a female saint who, according to legend, met our Saviour bending under the weight of the cross, and offered him her veil to wipe the sweat from his brow, when the divine features were found miraculously impressed on the cloth. This veil was brought from Palestine to Rome, where it is still preserved by the canons of St. Peter's.

Versailles (ver-sālz'; French pron. ver-sā-yé), a town of France, capital of the department of Seine-et-Oise, in a plain, 11 miles s.w. of Paris. It is regarded as one of the handsomest towns in Europe, having been built under the auspices of the sovereigns of France, particularly Louis XIV., who made it the seat of his court, and erected the palace. This is a large and imposing building with an extensive park and gardens, fine fountains, &c. Louis Philippe converted the palace into a national museum, and it contains an immense collection of statues and paintings representing personages and events connected with the French monarchy from Clovis downwards. In Oct. 1870 the Germans established their head-quarters at Versailles; and from March 1871 till 1879 it was the seat of the French government. Pop. 54,081.

Verse, a measured and cadenced form of speech or composition, usually adopted in poetry. It seems to be the natural language

of passion, yet it has unquestionably been improved and developed by art. The use of rhymed cadences is a comparatively modern invention. (See *Rhyme*.) Grammarians have elaborately classified the varieties of verse, and analytically distinguished the possible divisions of words into bars of accented and unaccented syllables. (See *Rhythm*.) The term is also applied to a line of poetry consisting of a certain number of metrical feet disposed according to the rules of the species of poetry which the author intends to compose. Verses are of various kinds, as hexameter, pentameter, &c. *Blank verse* is verse in which the lines do not end in rhymes. (See *Blank Verse*.) *Heroic verse* is rhymed verse in which the lines consist of ten syllables, five of them being accented, and constituting five iambic feet. See also *Alexandrine*.

Versez (ver'shets), a town of Hungary, county of Temesvar. It is the see of a Greek bishop, and has silk-mills, and a large trade in silk and wine. Pop. 24,727.

Verst, a Russian measure of length, equal to 3500 English feet, or very nearly two-thirds of a mile.

Ver'tebra. See *Spine*.

Vertebra'ta, the name given to the highest sub-kingdom of animals, consisting of those animals which in early life usually possess a backbone, but which invariably possess a *notochord* (which see); which have never more than four limbs disposed in pairs; which possess jaws as parts of the head; and which have the great nerve-centres contained within a special case formed by the skull and spinal column. In all Vertebrata save the lancelet a distinct heart is developed. The Vertebrata include the classes Pisces (fishes), Amphibia (frogs, &c.), Reptilia (reptiles), Aves (birds), and Mammalia (quadrupeds and man). They have also been classified into Ichthyopsida, including Pisces and Amphibia; Sauropsida, comprising Reptilia and Aves; and Mammalia. See these headings.

Verti'go (or ver'ti-), an attack of giddiness or swimming of the head in which objects appear to move in various directions though stationary, and the person affected finds it difficult to maintain an erect posture. It is a common symptom of an irregular (excessive or defective) supply of blood to the brain and of nervous and general debility; but it frequently arises from some disturbance of the digestive organs.

Vertue, GEORGE, a distinguished engraver,

born in Westminster in 1684. He enjoyed the patronage of Sir Godfrey Kneller, and became engraver to the Society of Antiquaries in 1717. He died in 1756. His best-known works include twelve Portraits of Poets and ten Portraits of Charles I. and his Friends.

Vertum'nus, a Roman deity who presided over crops and orchards. He is generally represented as a young man crowned with flowers, and holding in his right hand fruit, and a horn of plenty in his left. He was the husband of Pomona.

Ver'ulam, LORD. See *Bacon*.

Vervain. See *Verbena*.

Verviers (ver-vi-ä), a town of Belgium, province of Liège, on the Vesdre, 14 miles E.S.E. of Liège. It is celebrated for its manufacture of broad-cloth and woollen yarn, the staple of the town. There are also machinery, leather, and other manufactures. Pop. (with suburbs), 72,740.

Vesa'lius, ANDREAS, the father of modern anatomy, born at Brussels 1514, died at Zante 1564. He was physician to the Emperor Charles V. and to Philip II. His chief work, *De Corporis Humani Fabrica*, opened a new era in the science of medicine.

Vesoul (vé-söl), a town of France, capital of the department of Haute-Saône, on the Dugeon, 27 miles N. of Besançon. It is surrounded by vineyards, and is well built. Pop. 10,000.

Vespa. See *Wasp*.

Vespasia'nus, TITUS FLAVIUS, Emperor of Rome, was born near Reate, in the country



Coin of Vespasian.

of the Sabines, in A.D. 9. After serving with distinction in Germany and in Britain as commander of a legion, he was made consul. He afterwards became proconsul of Africa, and on the rebellion of the Jews he was sent with an army into Judæa (A.D. 66). He reduced nearly all Galilee, and was pre-

paring to attack Jerusalem when he received news of Nero's death (A.D. 68). Then followed the emperors Galba, Otho, and Vitellius, and in A.D. 69 Vespasian was himself elected emperor by the army, and arrived in Rome about the middle of the year 70, leaving the siege of Jerusalem to his son Titus. He immediately reformed the discipline of the army, purified the senatorial and equestrian orders, and improved the administration of justice. He favoured arts, letters, and learned men, particularly Quintilian, Pliny, and Josephus. He rebuilt a part of the city, restored the capitol, and erected the gigantic amphitheatre, the ruins of which are still celebrated under the name of the *Coliseum*. Vespasian died in June, A.D. 79.

Vespers, the evening service in R. Catholic and other churches, or the time of evening service, being the last of the canonical hours except compline.

Vespers, SICILIAN. See *Sicilian Vespers*.

Vespucci, AMERIGO. See *Amerigo Vespucci*.

Vesta, a Roman divinity, the goddess of the hearth. She was worshipped, along with the Penates, at every family meal, when the household assembled round the hearth, which was in the centre of the room. Her public sanctuary was in the Forum, and the sacred fire was kept constantly burning in it by the vestals, her priestesses. The vestals are said to have been established by Numa. There were at first four, and afterwards six of them. They were taken from six, to ten years of age. They were bound to virginity for thirty years, the term of their service, after which they were allowed to marry. Their persons were inviolable, and they were treated with great honour, and had important public privileges. The punishment of a vestal who was guilty of unchastity was burying alive.

Vesta, in astronomy. See *Asteroids*.

Vestals. See *Vesta*.

Vestments, SACRED, the official garments worn by ministers of religion. The term is also applied to the altar-cloths. Among Catholics and High Churchmen, who believe that Christianity has retained a special priesthood and ritual, much importance is attached to vestments. See *Ritualism*, also *Chasuble*, *Stole*, &c.

Vestry, a room adjoining a church where the vestments of the clergy are kept. Hence the place of meeting of those having the charge of parochial affairs, and collectively the persons themselves to whom these affairs

are intrusted. In England the minister, churchwardens, and chief men of a parish generally constitute a vestry, and the minister, whether rector, vicar, or perpetual curate, is ex-officio chairman. The powers of the vestry include the expenditure of the church funds, the repairing or alteration of churches or chapels, and the appointment of certain parish officers. In certain large and populous parishes *select vestries* are annually chosen from the chief or most respectable parishioners to represent and transact the business of the parish. In London the vestries are highly important bodies.

Vesuvius, a volcanic mountain of Southern Italy, 10 miles E.S.E. of Naples. It rises in the centre of a plain 2300 feet above the sea, in a pyramidal cone of about 1900 feet; total height, over 4200 feet, liable to alteration at eruptions. The cone is truncated, and about 2000 feet in diameter. Previous to an eruption about 1838 the top was an uneven plane, but was then converted into a hollow cup sloping to a depth of 500 feet. A precipitous rocky ridge, 1400 feet high, called Monte Somma, lies to the north of the cone, from which it is separated by a deep valley called the Atrio del Cavallo. At the western extremity of this valley an observatory has been established. The lower belt of the sloping plain is about 2 miles broad; it is laid out in vineyards and well cultivated. Above this belt the plain is rugged and covered with scorice. Monte Somma is supposed to have formerly formed a complete cone of larger dimensions than the present one, being subsequently altered by volcanic forces in the same manner as 800 feet of the present cone was carried away by an eruption of 1822. The first recorded symptoms of activity exhibited by Vesuvius occurred in A.D. 63. In 79 a great eruption buried Herculaneum and Pompeii. The next recorded discharge of liquid lava was in 1036. Since then there have been many violent eruptions, the most noted of which were that of 1631, when 18,000 lives were lost, and that of 1906, when there were most violent outbursts, a great flow of lava and some loss of life. Great outbursts took place in 1759, 1767, 1794, 1822, 1855, 1858, 1861, 1865, 1867-68, 1872, 1878, 1879, and 1885. A wire-rope railway was opened in 1880, and carries visitors to within a short distance of the crater.

Veszprim (ves'-), a town of Western Hungary, north of Lake Balaton, with a fine cathedral. Pop. 14,114.

Vetch, the popular name applied to plants of the genus *Vicia*, more especially to *V. sativa*, the common vetch or tare. The name is also applied, with various epithets, to many other leguminous plants of different genera; as, the *horse-shoe vetch*, of the genus *Hippocrepis*; the *milk-vetch*, of the genus *Astragalus*; &c. See *Tare*, *Vicia*.

Vet'inary Art, the art which deals with the nature, causes, and treatment of the disorders of domestic animals. The first veterinary school was instituted in 1762 at Lyons; in 1766 that at Alfort near Paris was opened. A similar institution was established at London in 1791, and in the year following one in Berlin. In Edinburgh instruction in veterinary medicine began to be given by Mr. Dick in 1819, and in veterinary surgery in 1823. He erected college buildings soon after, collected a museum, and at his death in 1866 left all his fortune to the endowment of this institution, now the Royal (Dick) Veterinary College. There is also a college in Glasgow. Both the London institution, now the Royal Veterinary College, Camden Town, and that at Edinburgh are flourishing institutions. In 1844 the English veterinary surgeons obtained a charter constituting them a corporation under the title of the Royal College of Veterinary Surgeons, and empowering them to appoint examiners and grant licenses or diplomas, the holders of which are members of this body (M.R.C.V.S.). There is a board of examiners for Scotland. In the army a veterinary surgeon is an officer ranking on admission with a lieutenant, and after a sufficient length of service with a major. In America veterinary chairs have been added to some of the universities, but most of the schools are private institutions.

Veto (Lat. 'I forbid'), the power which one branch of the legislature of a state has to negative the resolutions of another branch; or the right of the executive branch of government, such as king, president, or governor, to reject the bills, measures, or resolutions proposed by other branches. In Britain the power of the crown is confined to a veto, a right of rejecting and not resolving, and even this right is rarely exercised, the last occasion being in 1707. In the United States the president may veto all measures passed by congress, but after that right has been exercised the rejected bill may become law by being passed by two-thirds of each of the houses of congress.

Vevey, a town of Switzerland, canton

Vaud, beautifully situated at the N.E. margin of Lake Geneva, 11 miles E.S.E. of Lausanne, a favourite residence of foreigners. Pop. 12,000.

Viaduct. See *Bridge and Railways*.

Vianna, a seaport of Portugal, province of Minho, at the mouth of the Lima, 40 miles N. of Oporto. Pop. 9851.

Viareggio (vi-à-red'jō), a seaport of Central Italy, province of Lucca, on the Mediterranean, a favourite watering-place. Pop. 12,540.

Viat'icum, literally provision for a journey; in the R. Catholic Church, the eucharist administered to patients who are so ill as to be deemed beyond hope of recovery.

Viat'ka, a town of Russia, capital of the government of same name, on the Viatka, 500 miles E.N.E. of Moscow. It has a cathedral, some manufactures, and a large trade. Pop. 24,258.—The government has an area of 59,172 square miles, and a pop. of 3,023,788. The surface is much broken by low hills, and large tracts are under wood and natural pasture. The soil yields good crops of corn, flax, and hemp. The drainage belongs to the basin of the Volga.

Viborg, a town of Denmark, on the lake of Viborg, 36 miles N.W. of Aarhus. It is a bishop's see, and has a good cathedral; and manufactures of linen, tobacco, &c. Pop. 8623.

Vi'borg, or **WIBORG**, a seaport of Finland, capital of a government of the same name, on a deep inlet of the Gulf of Finland, 74 miles N.W. of St. Petersburg. It has an active export trade. Pop. 34,672.

Vib'rios, a name of certain infusoria or microscopic organisms, sometimes called *microscopic cels*, and now often regarded as bacteria, or of fungoid nature.

Vibur'num, a genus of plants, nat. order Caprifoliaceæ, including the gelder-rose and laurustine (which see), and *V. Lantāna*, the wayfaring tree, a native of Europe and the west of Asia. The young shoots are used in Germany for basket-making; the wood is sometimes employed in turning and cabinet-making; the berries are used for making ink, and the bark of the root for making bird-lime.

Vic'ar, in a general sense, a representative or vicegerent. The pope calls himself *vicar of Christ on earth*. In the Church of England a vicar is the priest of a parish who receives only the smaller tithes or a salary. A *vicar apostolic*, in the Roman Catholic Church, is a bishop who possesses no diocese,

VICE-ADMIRAL — VICTOR EMMANUEL II.

but who exercises jurisdiction over a certain district by direct authority of the pope; *vicar general*, the official assistant of a bishop or archbishop.

Vice-admiral. See *Admiral*.

Vice-chancellor. See *Chancellor*.

Vice-consul. See *Consul*.

Vicenza (vi-chen'tsà), a town of North Italy, capital of a province of the same name, 49 miles west of Venice, beautifully situated on the Bacchiglione, where joined by the Retrone at the foot of some wooded hills. It is well built, containing handsome streets and several elegant squares. The public buildings are almost all the work of Palladio, who was born here, or of scholars who rather slavishly imitated him. The most remarkable edifices are the Duomo or cathedral; the Palazzo della Ragione (town-hall), an ancient Gothic building, with fine connected buildings by Palladio; the Museum, one of Palladio's finest buildings; the Palazzo-Prefetizio, and the theatre, both by Palladio; the lyceum, churches, and hospitals. The manufactures are silk, woollen, and linen tissues, leather, earthenware, hats, &c. Vicenza (*Vicentia*) was founded above a century before the Christian era, and became a Roman municipal town. Pop. 44,261. —The province has an area of 940 square miles and a pop. of 446,521.

Viceroy, the governor of a kingdom or country, who rules in the name of the king or queen with regal authority as the king's or queen's substitute.

Vich (vich), a town of Spain, prov. Barcelona, with cotton and other manufactures. Pop. 12,478.

Vichy (vê-shâ), a town of France, in the department of the Allier, in a valley of the river of that name, 32 miles s.e. of Moulins. It was once a place of strength, and is celebrated for its thermal alkaline springs. The Vichy waters are in much request for disorders of the stomach and bowels, and of the urinary organs, in gout, rheumatism, &c. Much of the water is sent out in bottles. Pop. 15,000.

Vicia, the vetch genus of plants, which, besides the vetches, includes also the *V. Faba* or common field bean. See *Vetch*.

Vicksburg, a town of the United States, in Warren county, Mississippi, on the Mississippi, 400 miles above New Orleans. It is a port of entry, and has an extensive trade in cotton. Vicksburg was strongly fortified by the Confederates in the civil war, and the Unionist forces were repulsed

here on several occasions, but after a long siege General Pemberton surrendered the place to General Grant, July 4, 1863. Pop. 13,373.

Vico, GIOVANNI BATTISTA, a jurist, critic, and historian, was born at Naples in 1668, was educated by the Jesuits, and studied law. In 1697 he was appointed professor of rhetoric at the University of Naples, and in 1735 historiographer-royal. His *Principi d'una Scienza Nuova d'intorno alla Comune Natura delle Nazioni* (1725) has caused him to be regarded as one of the founders of the philosophy of history. He also wrote *De antiquissima Italorum Sapientia* and other works. Vico died at Naples, 20th January, 1744.

Victor Amadeus II., Duke of Savoy, and first king of Sardinia, born 1666, died 1732. He joined the Austrians in the war of the Spanish Succession, and at the Peace of Utrecht (1713) he obtained the addition of Sicily to his dominions. In 1720 he gave up that island to the Austrians in exchange for Sardinia, and then took the title of King of Sardinia. He abdicated in favour of his son Charles Emmanuel III. in 1730.

Victor Emmanuel (VITTORIO EMANUELE) II., the eldest son of Charles Albert, king of Sardinia, was born at Turin, March 14, 1820, and he married on April 12, 1842, Archduchess Adelaide of Austria. His aptitude for a military career became evident when he commanded the Savoy brigades against Austria (1848-49), and distinguished himself in the battle of Goito by his reckless valour. After the battle of Novara (March 23, 1849) his father abdicated, and Victor Emmanuel ascended the throne of Sardinia. He had then to negotiate with Austria under most unfavourable circumstances, but he steadily refused to give up the principle of representative government in the Sardinian constitution, and this gained for him the name of honest king (*re galantuomo*) and the good-will of the Italian people. This latter was only gained, however, after much calumny and misunderstanding, but the young king pursued from the first a policy which led to the national unity of Italy. Under the advice of his celebrated minister Cavour, he regulated the finances, reorganized the army, and secularized the church property, for which he was excommunicated by the pope. He took part in the Crimean war, and in 1859, assisted by France, renewed the contest with Austria, taking part in the battles of

VICTORIA.

Magenta (4th June) and Solferino (24th June). By the Treaty of Villafranca and the Peace of Zürich which followed these successes, Lombardy was added to his dominions, but he had to cede Savoy and Nice



Victor Emmanuel.

to France. Parma, Modena, and Tuscany now became united to Sardinia, and Garibaldi's successes in Sicily and Naples brought the whole of Southern Italy over to Victor Emmanuel. On March 17, 1861, he assumed the title of King of Italy, and early in 1865 Florence became the royal residence. By the Peace of Vienna (1866) Austria ceded Venetia, and on the withdrawal of the French garrison from Rome in 1870 the city annexed itself to Italy. The king entered Rome on July 2d, 1871, and took up his residence in the Quirinal. He died 9th June, 1878, and was succeeded by his son Humbert.

Victoria, a British colony in the south-east of Australia, bounded N. by New South Wales, S.E. by the Pacific, S. by Bass Strait and the Southern Ocean, and W. by South Australia; area, 87,884 square miles. It has about 600 geographical miles of sea-coast, with considerable bays and indentations, especially about the middle, where Port Phillip Bay, with an area of 875 square miles and an entrance barely 2 miles wide, affords shelter sufficient for the largest fleet. The interior, though diversified by mountains, is chiefly distinguished by vast unwooded plains mostly occupied as pasture. There is one principal mountain range, a portion of the Great Dividing Range of Eastern Australia, running from east to west through the colony, with various offshoots. The eastern portion of it, called the

Australian Alps, with numerous northern and western ramifications, rises in Mount Bogong to 6500 feet, in Mount Hotham to 6100 feet, and has several peaks exceeding 5000 feet. The most westerly portion, called the Grampians, runs north and south, and in Mount William reaches a height of 5600 feet. The Grampians and Australian Alps are connected by such ranges as the Pyrenees and Hume Range, containing numerous cones and extinct craters, and composed of metamorphic rocks of granite, quartz, syenite, &c. This is the region of the gold-fields. The rivers are numerous, but generally small and dry up in summer, leaving the country parched. The chief is the Murray, which rises in the Australian Alps, forms the northern boundary of the colony for 980 miles, is in all 1800 miles long, and is navigable for several hundred miles. The Yarra Yarra is a short navigable river, on which, at its entrance into Port Phillip Bay, Melbourne, the capital, is situated. Others are the Goulburn, Snowy, Glenelg, Wimmera, and Loddon. Lakes are numerous but small, and many of them are salt. The climate of Victoria is temperate, but liable to sudden fluctuation; and hot winds blow at intervals from November to February, causing great discomfort. The hottest period is in January and February, when the thermometer may rise to 108° in the shade. For the chief animal and vegetable products native to the colony see *Australia*. Some of the common English quadrupeds and birds have been introduced, such as hares, rabbits, deer, pheasants, partridges, larks, &c., and are now becoming quite plentiful. Rabbits are now so numerous in some districts as to prove a nuisance. Victoria is the second gold-producing colony of Australia, its annual production being over £3,000,000; from the discovery of gold in 1851 to the end of 1905, the quantity raised was 68,367,403 oz., of an aggregate value of £273,236,000. Coal, tin, silver, antimony, gypsum, and limestone are also among the minerals worked. Agriculture has greatly extended of late years, wheat and oats being the two cereals chiefly cultivated. Of 4,270,000 acres under cultivation, 2,280,000 acres are under wheat and 344,000 under oats. The great staple of the colony, however, is wool. The number of sheep in 1907 was over 13,000,000. There are also large numbers of cattle, horses, &c. The vine is extensively cultivated, and the wines are becoming well known in Europe. Many

VICTORIA — VICTORIA FALLS.

kinds of fruit are grown, also tobacco, hops, &c. The principal exports are gold, wool, wheat and flour, butter, live-stock, mutton, rabbits, hides, &c. The chief imports are textile goods. Total exports in 1906, £28,917,992; imports, £25,234,402. There are about 3500 miles of railway open (all belonging to the government), and about 4000 miles of telegraph line. In 1907 the manufactories of all descriptions numbered 4432, employing 86,467 hands. Victoria is popularly divided into the districts of Gippsland, Murray, Wimmera, Loddon, &c., and officially into thirty-seven counties. The government is vested in a governor appointed by the crown, aided by a ministry of nine members, and a parliament consisting of a legislative council of thirty-four members elected for six years (half retiring in three), and a legislative assembly of sixty-five elected for three. The annual revenue and the annual expenditure of the colony both now amount to about £8,000,000. The public debt is about £53,500,000. The colony possesses a small permanent military force, besides militia and volunteers, and there is a small fleet of war-vessels. Since 1901 Victoria has formed a state of the Australian Commonwealth. About 75 per cent of the population are Protestants, while the Roman Catholics make up about 22 per cent. Education is compulsory between the ages of six and thirteen. Besides the Melbourne University there are several colleges connected with various religious denominations. Victoria was first colonized from Tasmania in 1834. It made rapid progress, especially in sheep breeding, and the discovery of gold in 1851 caused a rush of population from all parts. Hitherto it had been known as Port Phillip, and formed part of New South Wales, but in this year (independently of the gold discovery) it was erected into a separate colony under the name of Victoria. In 1850 the population numbered 76,162; in 1854 it was 312,307. In 1856 responsible government was conferred on the colony. The chief towns are Melbourne (the capital), Ballarat, Bendigo, and Geelong. Pop. in 1881, 862,346; in 1891, 1,140,405; in 1901, 1,201,341, including 7349 Chinese and 652 aborigines.

Victoria, capital of British Columbia, at the south end of Vancouver Island, on an inlet from the Strait of Juan de Fuca, in very beautiful scenery. There are government buildings, town-hall, cathedral, &c.,

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and handsome streets. The harbour is excellent and there is a large trade. Esquimaux, 3 miles distant, is a fortified naval station. Pop. 27,500.

Victoria. See *Hong-Kong*.

Victoria and Albert, ROYAL ORDER OF, a British order instituted for ladies in 1862, enlarged in 1864, 1865, and 1880. There are about seventy ladies belonging to the four classes into which the order is divided.

Victoria and Albert Museum, the official name since 1899 of the South Kensington Museum (which see).

Victoria Bridge. See *Bridge, Montreal*.

Victoria Cave, a cave in the West Riding of Yorkshire, fully a mile north of Settle, discovered in 1837. It has yielded bones of the elephant, hyæna, and other animals no longer found in Britain, and also many relics of the Roman and earlier periods.

Victoria Cross, a British military decoration, instituted at the close of the Crimean war in 1856. It is granted to soldiers and sailors of any rank for a single act of valour in presence of the enemy. It was instituted in imitation of the French cross of the Legion of Honour. It is a bronze Maltese cross, with a royal crown in the centre, surmounted by a lion, and the words 'For Valour' indented on a scroll below the crown.



Victoria Cross.

The ribbon is red for the army, and blue for the navy. A pension of £10 a year accompanies the decoration, when gained by anyone under the rank of commissioned officer, with an additional clasp and £5 if gained a second time.

Victoria Falls, a cataract of the Zambesi (which see), in Rhodesia, not far from its western boundary. The river here, nearly a mile broad, drops 340 feet into a narrow transverse fissure or crack crossing its course, the water then passing away in a narrow rocky gorge. A great railway bridge now crosses the river here (see *Bridge*); and there is a scheme started for utilizing the falls to generate electric power for the Johannesburg gold-mines and other

purposes, though it will have to be transmitted over a distance of some 600 miles.

Victoria Harbour. See *Labuan*.

Victoria I. (ALEXANDRINA), Queen of Great Britain and Ireland and Empress of India, only child of Edward, duke of Kent, and of his wife Princess Victoria Mary Louisa, daughter of the Duke of Saxe-Coburg-Saalfeld, widow of the Prince of Leiningen, and sister of King Leopold of Belgium, was born at Kensington Palace, May 24, 1819. Her father died January 23, 1820, and she became heiress-presumptive to the crown on the accession of William



Queen Victoria.

IV. in 1833. On the death of the latter (June 20, 1837) she ascended the throne of Great Britain and Ireland, that of Hanover falling by the Salic law to her uncle, the Duke of Cumberland. She was crowned in Westminster Abbey, June 28, 1838, and on Feb. 10, 1840, married her cousin, Prince Albert of Saxe-Coburg-Gotha. She had issue: Victoria, Princess Royal, born 21st Nov., 1840, married 25th Jan., 1858, Frederick, crown prince of Prussia, afterwards German Emperor, died Aug. 5, 1901; Albert Edward, now Edward VII., born 9th Nov., 1841, married 10th March, 1863, Alexandra, daughter of the King of Denmark; Alice Maud Mary, born 25th April, 1843, married 1st July, 1862, the Grand Duke of Hesse, died 14th December, 1878; Alfred Ernest, duke of Edinburgh and of Saxe-Coburg, born 6th August, 1844,

married 23rd January, 1874, Grand Duchess Marie of Russia, died 30th July, 1900; Helena Augusta Victoria, born 25th May, 1846, married 5th July, 1866, Prince Frederick Christian of Schleswig-Holstein; Louise Caroline Alberta, born 18th March, 1848, married 21st March, 1871, John, marquis of Lorne, now Duke of Argyll; Arthur, duke of Connaught, born 1st May, 1850, married 13th March, 1879, Princess Louise Margaret of Prussia; Leopold, duke of Albany, born 7th April, 1853, married 27th April, 1882, Princess Helen of Waldeck, died 28th March, 1884; Beatrice Mary Victoria Feodora, born 14th April, 1857, married 23rd July, 1885, Prince Henry Maurice of Battenberg. Her husband, Prince Albert, died on 14th December, 1861, a blow which so affected the queen that she made but few appearances in public for years. In 1876 she assumed the title of Empress of India. The jubilee of her reign was celebrated in 1887 and the 'diamond jubilee' in 1897. She wrote *Leaves from the Journal of Our Life in the Highlands* (1868), and *More Leaves* (1884). She died at Osborne House, Isle of Wight, on 22nd January, 1901, and was succeeded by her eldest son Edward VII. Her reign is the longest in English history, and few sovereigns have had a longer. Her remains were placed beside those of Prince Albert in the mausoleum at Frogmore. See *Britain*.

Victoria Nyanza, a lake of East Africa, about 400 miles inland from the Indian Ocean, crossed near its north end by the equator, about 3800 feet above the sea; area, 29,000 square miles, or nearly as large as Scotland. It communicates with the Albert Nyanza by means of the Victoria Nile, and is the principal feeder of the White Nile. It contains many islands, some of them of considerable size. It was discovered by Captain Speke in 1858. Its northern shores belong to British East Africa and its southern to German East Africa. It is now easily reached by railway from Mombasa, and small steamers navigate its waters.

Victoria Regia, a magnificent water-lily, first found in the river Berbice, in British Guiana, in 1837, by Sir Robert Schomburgk. It belongs to the natural order Nymphaeaceæ, and was dedicated by the discoverer to Queen Victoria. The leaves measure 5 or 6 feet across; they are of a bright green above and a deep violet on the lower

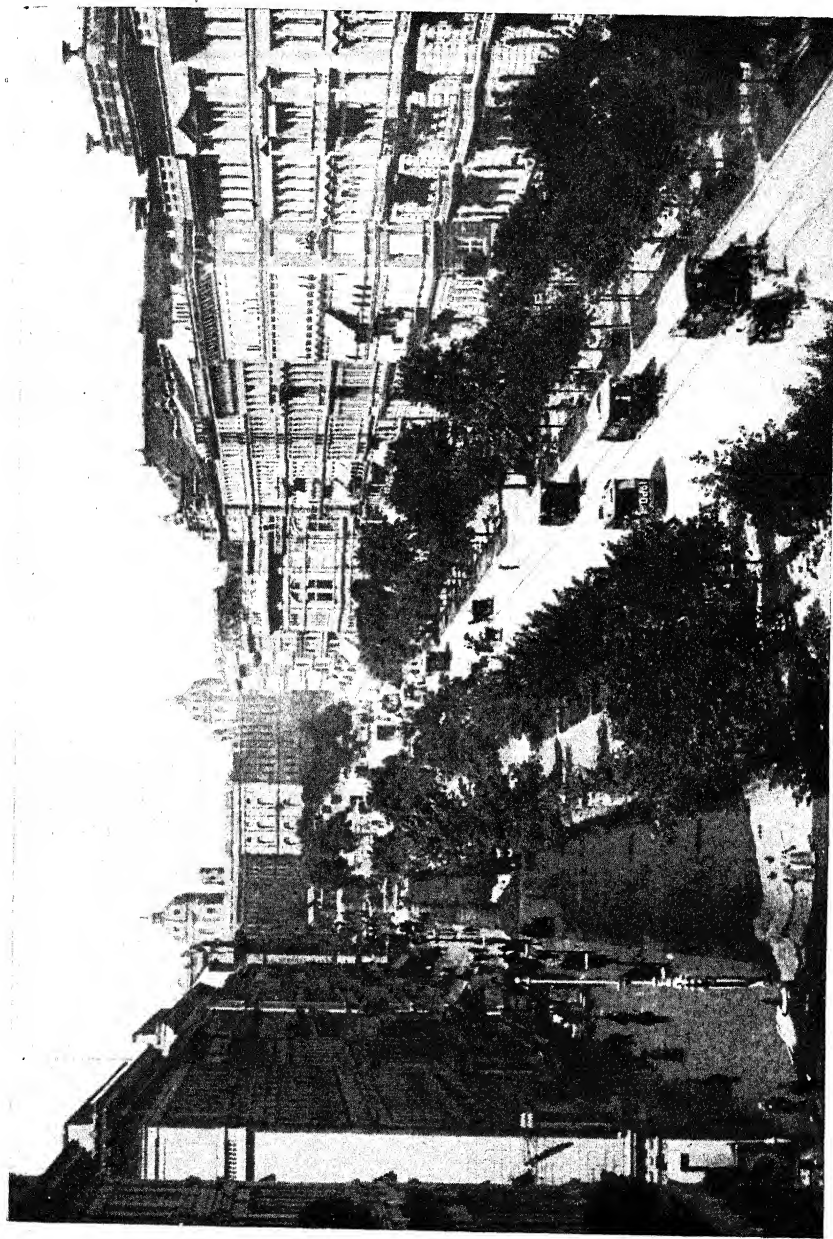
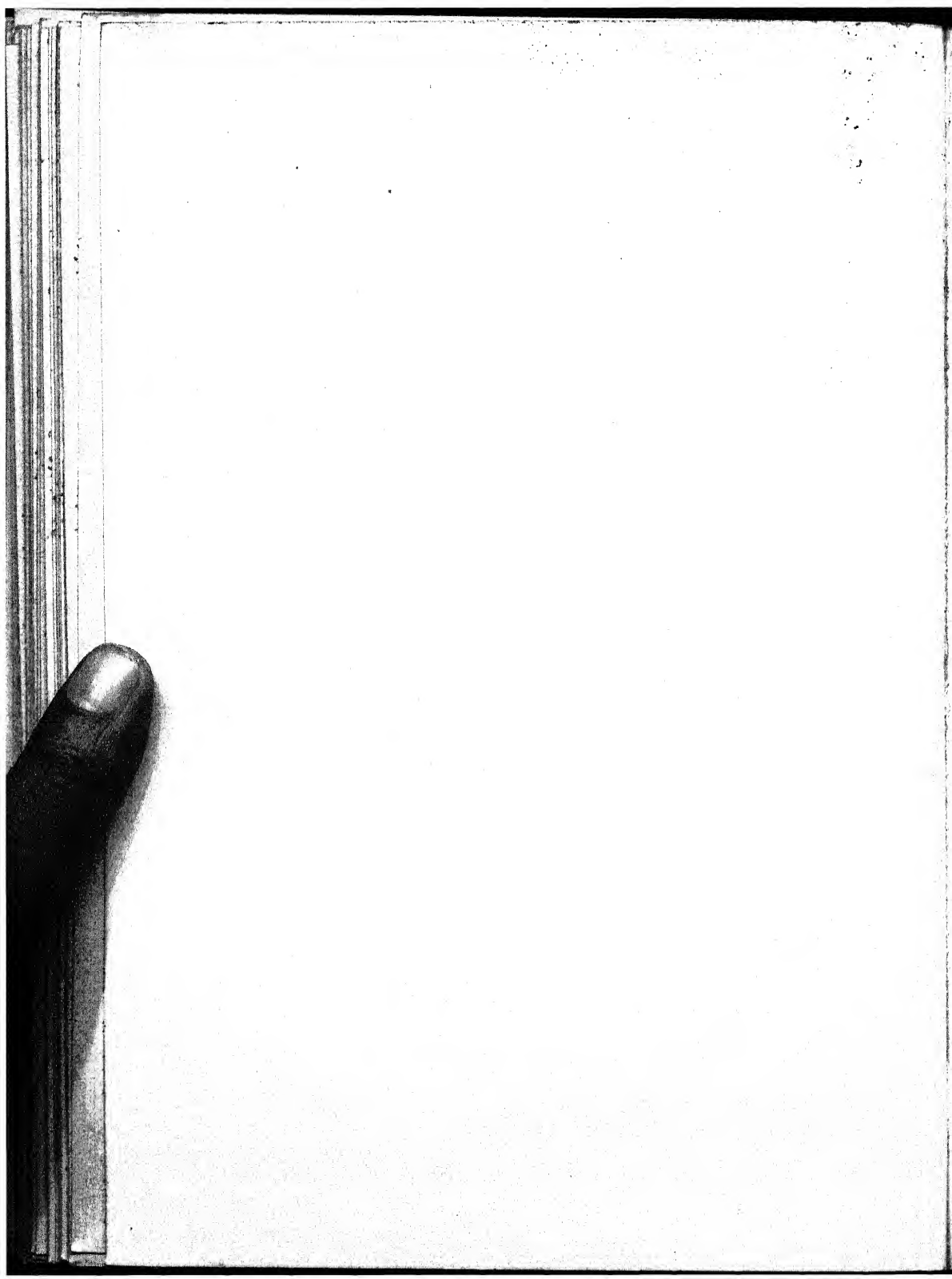


Photo. Photochrom Co. Ltd.

VIENNA: KÄRNTNER-RING (PART OF THE RING-STRASSE)



surface, with a uniformly turned-up margin about 3 inches high. The flowers are more than 1 foot in diameter, are of all shades from white to pink, and exhale an agreeable odour. The plant is successfully cultivated in hothouses in Britain.

Victoria University, formerly a federal university consisting of Owens College, Manchester, University College, Liverpool, and Yorkshire College, Leeds. It was founded by royal charter in 1880, but in 1903 the Liverpool college was separated to form the University of Liverpool, and the other two colleges received separate charters in 1904 as the Victoria University of Manchester and the University of Leeds. See *Owens College*.

Vicuña (vi-kun'yà), a ruminant animal (*Auchenia vicugna*) closely allied to the llama. It is a native of South America, frequenting the lofty slopes of the Andes of Chili, &c., near the region of perpetual snow, and somewhat resembles the chamois in its habits. See *Llama*.

Vidocq (vè-dok), EUGÈNE FRANÇOIS, a notorious rascal who became the head of a Parisian detective department in 1812. He was born at Arras in 1775, and had a most varied and disreputable career prior to his official appointment. He was by turns a performer at a travelling show, a soldier, a galley-slave, and a highwayman. He was as unscrupulous in office as he had been in private life, and was dismissed in 1825. A private detective office subsequently started by him was closed by the authorities. He died in 1857. His *Mémoires* (1828) are supposed to be spurious.

Vienna (Ger. *Wien*), the capital of the Austrian Empire, is situated in a plain on the right bank of the river Danube, and is intersected by a narrow arm of the river into which fall the Wien and other small streams. The city consists of the Innere Stadt, or old town, and numerous municipal districts, besides extensive suburbs. The old town is still the court and fashionable quarter of the city, and is encircled by the Ringstrasse, a handsome boulevard, 55 yards wide. Vienna is on the whole a handsome, well-built town, with fine squares and straight and spacious streets. The Prater, a public park on the bank of the Danube, is about 4 miles long and 2 broad, and is considered the finest public park in Europe. Of the churches the most remarkable is the Dom-kirche, or cathedral of St. Stephen, a cruciform Gothic structure, erected in the

14th and 15th centuries. The interior is adorned with numerous statues and monuments. Its main tower, about 450 feet in height, was built between 1359 and 1433, and partly reconstructed in 1860-64. It contains a bell weighing over 20 tons, which was cast from cannon captured from the Turks. The other noteworthy churches are: the Augustinian church (1330), containing the hearts of the dead members of the imperial family; the Bohemian National Church (Maria am Gestade), built 1340-94 and restored 1820, with fine stained glass and a striking tower; the Italian National Church (Maria-Schnee); the University or Jesuit church (1628-31), in Late Renaissance style; the Capuchin church, with the burying-vault of the Hapsburgs; the Votivkirche (1856-79), one of the finest examples of modern Gothic. The imperial palace (Kaiserliche Hofburg), in the heart of the city, is a large and ancient structure, with modern additions; the imperial summer residence, Schönbrunn, in the south-western suburbs, is mainly of the 18th century, and has extensive and attractive grounds. The modern palaces of the archdukes and others of the nobility are, many of them, handsome buildings. Deserving of special mention are the Reichsrat or parliament building (1883), in Greek style, the magnificent Gothic town-house (1872-83), the palace of justice (1875-81), in German Renaissance style, the museums of art and natural history, both Renaissance buildings, and the exchange. The university was founded in 1365, and its medical faculty enjoys a world-wide reputation. There are over 500 teachers, 6500 students, and a library of 340,000 vols. Other notable public buildings are the Josephinum (an academy for army surgeons), the Technical High School (founded 1815 and reorganized in 1870), the arsenal, and the mint. There are also theological institutes, an academy of fine arts, a conservatoire of music, public libraries and museums, and a number of gymnasia and other schools. The imperial library contains 400,000 volumes and 20,000 MSS. Some of the collections in the museums and galleries are among the finest in the world. Hospitals and other benevolent institutions, scientific and literary associations, are of course numerous. The principal theatres are the Hofburg and the fine Opera-house. The general hospital is a magnificent institution in close touch with the medical faculty. Vienna is the first

VIENNA — VIERWALDSTÄTTERSEE.

manufacturing town in the empire, and its manufactures include silks, woollens, cottons, machinery, cycles, scientific instruments, musical instruments, safes, furniture, art objects, jewellery, chemicals, beer, leather goods, artificial flowers, &c. There is a large trade, both by rail and river. Vienna was a Roman station in the 1st century, the early form of the name being Vindobona. After being taken by Attila about 450, and by Charlemagne about 791, it became the capital of the margraviate of Austria in 1142, and a free imperial city in 1237. It became the see of a bishop in 1480, of an archbishop not till 1723. It was unsuccessfully besieged by Solymán II. in 1529, and by Kara Mustapha in 1683, being saved on the latter occasion by John Sobieski, king of Poland. Napoleon occupied it on 13th November, 1805, and 12th May, 1809. There was a revolutionary outbreak in the city in 1848. The old walls were demolished in 1860. It is now the centre of a great railway system, and the regulation and deepening of the Danube is expected to make it the centre of the shipping trade between eastern and western Europe. An international exhibition was held in Vienna in 1873. In 1881 the Ring Theatre was burned down, when about 600 lives were lost. Pop. 1,687,540.

Vienna, CONGRESS OF. This congress was assembled on November 1st, 1814, to reorganize the political system of Europe after the first overthrow of Napoleon. The principal powers represented in it were Austria, Russia, Prussia, Britain, and France. Spain, Portugal, Sweden, and other minor powers were also consulted on matters more nearly concerning them. The leading territorial adjustments effected by the congress were the following:—Austria recovered Lombardy and Venetia, while Tuscany and Modena were conferred on collateral branches of the imperial house. The King of Sardinia recovered Piedmont and Savoy, with the addition of Genoa. Murat retained Naples, but the Bourbons were soon reinstated. Holland and Belgium were erected into a kingdom for the Prince of Orange, William I. Hanover, with the title of king, returned to the King of England, and Great Britain retained Malta, Heligoland, and several conquered colonies. A federative constitution, with a diet at Frankfort, was established for Germany. Prussia received the duchy of Posen, the Rhine province, and a part of Saxony. Russia received the

greater part of the grand duchy of Warsaw, Cracow becoming a free state, protected by Russia, Austria, and Prussia. Sweden retained Norway, and Denmark was indemnified with Lauenburg. The congress was suddenly broken up by Napoleon's escape from Elba (February 1815); but its acts were signed by the powers interested on 9th June, 1815.

Vienne (vê-enn), a western department of France, in the old province of Poitou, bounded by the departments of Indre-et-Loire, Indre, Haute-Vienne, Charente, Deux-Sèvres, and Maine-et-Loire; area, 2711 square miles. The surface is generally flat; it is well watered, chiefly by the Vienne and its tributaries. Three-fifths of the surface is arable, and wheat, oats, barley, rye, fruit, and wine are produced. Cattle and sheep are fairly numerous. Iron is abundant, and there are excellent quarries of marble, granite, mill-stones, whetstones, lithographic stones, and limestone. The manufactures consist of woollens, lace, cutlery, paper, pig-iron, &c. The capital is Poitiers. Pop. 336,343. — **HAUTE-VIENNE** (ôt-vê-enn; 'Upper Vienne') is a hilly department adjoining Vienne on the south-east; area, 2130 sq. miles. Almost the whole department belongs to the basin of the Loire, and it is crossed by the upper course of the Vienne. The principal crops are buckwheat, rye, beans, and peas; and horses, mules, and swine of a superior breed are reared. Minerals include iron, copper, tin, lead, coal, antimony, and kaolin. Porcelain, woollen and other tissues, paper, and leather are the chief manufactures. Limoges is the capital. Pop. 381,753.

Vienne, a town of France, in the department of Isère, on the Rhone, at the confluence of the Gère, 49 miles N.W. of Grenoble. It is an ancient place, with narrow dark streets. It has an ancient cathedral, a museum, public library, college, &c. Vienne contains numerous Roman remains, and figures prominently in ecclesiastical history. It was formerly the seat of an archbishop. Pop. 24,619.

Viersen (fêr-zén), a town of Rhenish Prussia, district of Düsseldorf, 18 miles west of the town of that name, and 10 miles south-west of Crefeld. It has important manufactures of satin, plush, silk, woollen, linen, and cotton fabrics; leather, tobacco, &c. Pop. 24,761.

Vierwaldstättersee (fêr-vâlt-stet-er-zâ). See *Lucerne, Lake of*.

Vierzon (vyâr-zôn), or **VIERZON-VILLE**, a French town, in the department of Cher, on the right bank of the Yèvre, at its confluence with the Cher, and on the Canal du Berry, 120 miles south of Paris. It has manufactures of porcelain, glass, agricultural machinery, &c., and a considerable trade. Pop. 11,796.

Vigevano (vi-jev'a-nō), a town of Italy, in the province of Pavia, near the right bank of the Ticino, 15 miles s.s.e. of Novara, with a cathedral and a large market-place surrounded by arcades. It is a bishop's see, and has manufactures of silks, hats, soap, and macaroni. Pop. of commune, 23,909.

Vigfússon, **GUDBRANDR**, Scandinavian scholar, born in Iceland 1823, died at Oxford 1889. He was educated first at the high school of Reikiavik, afterwards at Copenhagen University. He lived in Copenhagen from 1849 till 1864, having devoted himself to the study of old Icelandic literature. His first work, *Tímatöl*, on the chronology of the Sagas, was published in 1855, and revealed the hand of a master. In 1858 he brought out the *Biskupa Sögur*, or Lives of the Icelandic Bishops, and in 1864 the *Eyrbyggja Saga*. In the latter year he came to England to undertake the Icelandic-English Lexicon, begun by Cleasby, and in 1866 began at Oxford this work, which kept him engaged for seven years, the result being the excellent dictionary issued from the Clarendon Press. In 1878 the Clarendon Press published his *Sturlunga Saga*, to which he prefixed *Prolegomena* containing a complete history of the classic literature of Iceland. This was followed by several minor works and essays, by the *Orkneyinga Saga* and *Hakonar Saga*, and by the *Corpus Poeticum Boreale* (in conjunction with F. York Powell), a complete collection of the ancient Icelandic poetry, with translation, published in 1883. He was latterly engaged upon a work entitled *Origines Islandiæ*, but died before its completion. He was an honorary M.A. of Oxford University, and in 1884 was appointed lecturer in Icelandic and kindred subjects.

Vigil (Latin, *vigil*, watchful), an ecclesiastical term applied at first to the evening, and afterwards to the whole day, preceding a great festival. This name originated from the circumstance that the early Christians spent a part of the night preceding such festivals in prayers, to prepare themselves for the coming celebration.

Vigilance Committees, in the United States, unauthorized societies formed to deal out summary justice, especially in rude and freshly peopled districts.

Vignette, any kind of wood-cut or engraving not enclosed within a definite border, especially such as are placed on the title-page of a book, opposite the frontispiece. It is also the name given to a photograph in which the ground shades off gradually towards the edges.

Vigny (vën-yè), **ALFRED VICTOR, COMTE DE**, French poet and novelist, born at Loches, in Touraine, in 1797, entered the army in 1814, but retired from military service in 1828, and devoted himself exclusively to literature. He died in Paris in 1863. A small volume of *Poèmes* published in 1822 attracted little attention. It was followed by the more important *Poèmes Antiques et Modernes* in 1826, containing such finely mystical pieces as *Moïse*, *Éloa* ou *La Sœur des Anges*, and *Le Déluge*. The same year witnessed the appearance of the historical novel, *Cinq-Mars ou une Conjuration sous Louis XIII.*, which shows the influence of Sir Walter Scott. De Vigny's first theatrical venture was a translation of *Othello* (1829); it was followed by *La Maréchale D'Ancre* (1831) and *Chatterton* (1835), the latter of which was brilliantly successful. Other works are *Consultations du Docteur Noir* (1832), *Servitude et Grandeur Militaires* (1835), and the posthumous *Les Destinées* (1864), the first two in prose, the last a philosophical poem. A part of his journal was given to the world in 1867. From 1845 he was a member of the Academy. De Vigny was associated with the romantic movement in French literature, but he stands apart from its main stream. Grandeur, simplicity, and solemnity are the dominant characteristics of his poetry, and his outlook is that of pessimistic stoicism.

Vigo, a city and seaport of North-western Spain, in the province of Pontevedra, on the south side of the spacious bay called *Ria de Vigo*, on the slope of a hill crowned by a fort, 80 miles s.s.w. of Corunna. It is surrounded by walls, and the older part of the town has steep, narrow, and tortuous streets. The fishing of sardines and tunnies is important, and there is an active foreign trade. The sea-bathing is excellent. On October 12, 1702, Admiral Rooke at the head of an English fleet completely defeated a Franco-Spanish fleet in the bay and captured a large amount of treasure. Pop. 23,259.

Vik'ing (from the Icelandic *vík*, a bay or fiord, and the termination *ing*, implying one who belongs to or is descended from: literally one who lurked in bays and issued thence to plunder), a rover or sea-robber belonging to one of the bands of Northmen who scoured the European seas during the 8th, 9th, and 10th centuries. This word has been frequently confounded with *sea-king*, a term which is applied to a man of royal race, who took by right the title of king when he assumed the command of men, although only of a ship's crew; whereas the former term is applicable to any member of the rover bands. See *Northmen*.

Vil'ayet, a name officially applied since 1865 to the large administrative districts of Turkey.

Villa-alta (vil'yá-), a town of Mexico, state of Oajaca, in a fruitful region producing coffee, tobacco, &c. Pop. 44,362.

Villach (vil'ál'), an old and picturesquely situated industrial town of Austria, in Carinthia, on the Drave, with warm sulphur baths in the neighbourhood. Pop. 9690.

Villafranca, a town of Italy, province of Verona, on the Tartaro. It is celebrated as having been the centre of the wars of 1848 and 1866. The preliminaries of peace between Napoleon III. and the Emperor of Austria were signed here, July 11, 1859. Pop. 4205.

Villajoyosa (vil-yá-hó-yó'sá), a seaport of Spain, prov. Alicante, in the Mediterranean. Pop. 9321.

Villareal (vil-yá-rá-ál'), a town of Spain, prov. Castillon, surrounded by old walls. Pop. 12,887.

Villars (vil-är), **CLAUDE LOUIS HECTOR, DUC DE**, one of the greatest generals of the age of Louis XIV., was the son of the Marquis de Villars, and was born at Moulins in 1653. He early distinguished himself under Turenne, Condé, and Luxembourg, and was created *maréchal de camp* in 1690, and lieutenant-general in 1693. In the wars of the Spanish succession he was sent to co-operate with the Elector of Bavaria. He defeated Prince Louis of Baden at Friedlingen, 14th October, 1702, for which he received the marshal's baton; and having joined the elector he defeated the Prince of Baden at Höchstädt, 21st Sept., 1703. His success in dealing with the insurrection of the Camisards (see *Camisards* and *Cavalier, Jean*) obtained for him the title of duke (1705). Having been sent to defend the frontier against Marlborough, he forced the formid-

able lines of Stollhofen, near Strasburg, and penetrated far into Germany (1705-1707). In 1709 he replaced Vendôme in Flanders, and fought the battle of Malplaquet against Marlborough and Eugene, in which he was seriously wounded. In 1712 he defeated the allies at Denain, took Marchiennes, and relieved Landrecy. After the Peace of Utrecht he opposed Eugene with uninterrupted success, and negotiated with him the Peace of Rastadt, 7th March, 1714. On the renewal of the war with Austria in 1733 he was sent to Italy at the head of an army, with the title of Marshal-general of France. After a successful campaign, he died at Turin, 1734.

Villefranche (vél-fränsh'), a town of France, dep. Aveyron, at the junction of the Alzou with the Aveyron. Pop. 7760.

Villefranche-sur-Saône, a town of France, in the department of Rhône, on the Saône, 20 miles N.W. of Lyons. Pop. 15,500.

Villehardouin (vil-är-dü-an), **GEOFFROY DE**, French historian, born about 1160, died about 1213. He took an important part in the fourth crusade, was present at the siege and capture of Constantinople, and when the Greek emperor was overthrown and Baldwin established in his stead, he received an extensive territory for himself in Thrace. His *Histoire de la Conquête de Constantinople*, is one of the most valuable historical works of the middle ages.

Villeins, a species of feudal serfs who were allowed to hold portions of land at the will of their lord, on condition of performing menial and non-military services. It frequently happened that lands held in villenage descended in uninterrupted succession from father to son, until at length the occupiers or villeins became entitled, by prescription or custom, to hold their lands so long as they performed the required services. And although the villeins themselves acquired freedom, or their land came into the possession of freemen, the villen services were still the condition of the tenure, according to the custom of the manor. These customs were preserved and evidenced by the rolls of the several courts-baron, in which they were entered, or kept on foot by the constant immemorial usage of the several manors in which the lands lay. And as such tenants had nothing to show for their estates but the entries into those rolls, or copies of them authenticated by the steward, they at last came to be called *tenants by copy of court-roll*, and their tenure a *copy-hold*.

Villeneuve (vêl-neuv), **PIERRE CHARLES JEAN BAPTISTE SILVESTRE DE**, a French admiral, born in 1763, entered the navy in 1777. He led the rear division at the battle of the Nile, and escaped with his own and four other ships to Malta. In 1804 he was made vice-admiral, and in 1805 Napoleon appointed him to the command of the Toulon squadron, with orders to divert the British fleet from the European coasts. He was eventually shut up in Cadiz by Nelson, but with the hope of repairing his ill success by a brilliant victory he sailed out of Cadiz, along with the Spanish fleet under Gravina, and offered the enemy battle off Cape Trafalgar (which see). Villeneuve's flagship, the *Bucentaure*, was captured, and the admiral taken as prisoner to England. In April 1806 he was released and returned to France, but learning that his reception by the emperor would be unfavourable, he committed suicide.

Villiers. See *Buckingham*.

Vilna, or **WILNA**, a town of Russia, capital of the government of the same name, on the Vilia. It is picturesquely situated, and contains numerous churches and convents. It has a governor's palace, a town-house, Greek and Roman Catholic cathedrals, and numerous educational establishments. There is a considerable trade in agricultural produce sent to Baltic ports. Pop. 154,532.—The government, which lies in the Baltic, has an area of 16,406 square miles and a population of 1,591,207. The surface is generally flat, and the government produces good crops of grain, hemp, and flax. Manufactures and trade are limited.

Vimeiro (vi-mă'ry), a village of Portuguese Estremadura, 3 miles from Torres Vedras. It is remarkable for the battle between Wellington and Junot, fought on the 21st of August, 1808, which was followed by the Convention of Cintra (August 30).

Vincennes (van-senn), a town of France, department of the Seine, about 2 miles east of Paris. Its large old castle was once the residence of the French kings, but was converted into a state prison by Louis XI. A new fort and an arsenal were constructed in 1848-52. After the siege of Paris by the Germans, Vincennes was occupied by the Communist troops, but it surrendered to the Versailles troops, 28th May, 1871. It is a suburb of Paris. Pop. 34,000.

Vincent, JOHN JERVIS, EARL OF ST., a distinguished naval commander, descended of a respectable family in Staffordshire, was

born in 1734. He entered the navy at an early age, and commanded the *Foudroyant* in the action between Admiral Keppel and the French fleet in July 1778. In 1794 he commanded a squadron in the West Indies, and reduced Martinique, Guadeloupe, and St. Lucia. On the 14th Feb. 1797, in command of the Mediterranean squadron of fifteen sail, he defeated twenty-seven Spanish ships of the line off Cape St. Vincent, and was created a peer with the title of Baron Jervis and Earl of St. Vincent, and a pension of £3000 a year. In 1799 he became admiral; in 1801 first lord of the admiralty; and in 1821 admiral of the fleet. He died in 1823.

Vincent, Sr., one of the British West India Islands. See *St. Vincent*.

Vincent de Paul, Sr. See *Paul, St. Vincent de*.

Vinci (vin'chē), **LEONARDO DA**, one of the greatest Italian painters, also distinguished as a sculptor, architect, and civil and military engineer, a scientific inventor, and a man of universal genius, was the natural son of Pietro da Vinci, a Florentine notary, and was born at the village of Vinci, near Florence, in 1452. He excelled in all accomplishments, and acquired distinction in mathematics, physics, botany, anatomy, literature, and philosophy; but he especially excelled in the arts of design, and his father placed him in the studio of Andrea Verocchio, a celebrated painter and sculptor, who was soon surpassed by his pupil. Two of his earlier productions are still extant: The Adoration of the Magi, in the gallery of the Uffizi at Florence, and The Virgin of the Rocks in the British National Gallery. About 1482 he entered the service of Ludovico il Moro, duke of Milan, by whom he was employed in engineering as well as artistic work. His great painting of the Lord's Supper was finished in 1499. The original has been wholly defaced, but judging from copies and engravings, this work is universally regarded as one of the greatest ever produced. One of the best copies is that in the Royal Academy, London, by his pupil Marco d'Oggionno. After the occupation of Milan by Louis XII. (1499) he retired to Florence, where he painted his celebrated portrait of Mona Lisa del Giocondo, known as La Gioconda, in the Louvre. In 1502 he was appointed chief engineer and architect of the pope's army, and visited many of the fortified posts in the papal dominions. In 1507 he returned to Milan,

and painted a Madonna and Child in the palace of the Melzi at Vaprio. In 1512 he painted two portraits of Duke Maximilian, son of Ludovico, and in 1516 accompanied Francis I. to France. He died at Cloux, near Amboise, 2d May, 1519. Leonardo executed several important engineering works



Leonardo da Vinci.

at Milan, and wrote numerous treatises, few of which have been published. His *Trattato della Pittura* was printed in 1651, and contains a mass of information on the principles of art, of which all subsequent writers have availed themselves. In 1797 some fragments of Da Vinci's were published at Paris under the title of *Essai sur les Ouvrages Physico-Mathématiques de Léonard da Vinci*, &c., which created a profound sensation by their scientific insight and anticipation of modern discoveries. Da Vinci's paintings were the result of profound theoretical study of his art; he executed slowly, and was seldom satisfied with his finish of a picture, so high was his ideal. His knowledge of anatomy was deep. He made a special study of the human countenance under all circumstances. His extant works are few, and some of those attributed to him are believed to have been executed by his pupils.

Vindhya (vind'hya) Mountains, a mountain range in India, stretching east to west from the basin of the Ganges to Guzerat. It forms the N. boundary of the valley of the Nerbudda, and unites the N. extremities of the Eastern and Western Ghauts. It is of granitic formation, overlaid with sandstone.

Vine, a well-known climbing shrub, type of the order Vitaceæ, which consists of climbing plants with woody stems, simple or compound leaves, peduncles sometimes

changed into tendrils, small green flowers, and round berries. The species are found in both the Old and New Worlds, especially in Asia. The best known and most useful of the order is the *Vitis vinifera*, the grape-vine, cultivated in the Old World from time immemorial, of which there are numerous varieties, distinguished by possessing lobed sinuately-toothed, naked or downy leaves. It is a native of Central Asia, and its cultivation extends from near 55° north latitude to the equator, but in south latitudes it only extends to about 40°. It is rarely grown at a greater altitude than 3000 feet. In favourable seasons the vine ripens in the open air in England, and in the 11th and 12th centuries considerable quantities of inferior wine were made from native grapes. Vineyards proper are now unknown in Britain, but excellent grapes are raised in hot-houses. France is probably the greatest vine-growing country in the world. Several species of vine are indigenous in North America, as the *Vitis Labrusca*, the wild vine or fox-grape; *V. cordifolia* or *riparia*, heart-leaved vine, river-side vine, or frost-grape; and *V. astivalis*, the summer grape. About 1771 a European vine was introduced on the Pacific slope, and the culture has increased to great dimensions, especially in California. In other parts of the U. States, however, the native American varieties are chiefly cultivated. The vine has also been introduced into Australia, where it thrives well, and quantities of wine are produced. The vine grows in every sort of soil, but that which is light and gravelly is best suited for the production of fine wines. It is a long-lived plant, indeed, in suitable climates the period of its existence is not known. It is propagated from seeds, layers, cuttings, grafting, and by inoculation, the first method being used for obtaining new varieties. Some vines produce dark-coloured berries (black or red so called), others white. The Burgundy may be considered the most general vineyard grape of France, and the best wines in Italy and Spain are also made from grapes of this description. The sweet wines are made from sweet-berried grapes allowed to remain on the plants till overripe. Most varieties of the vine bear only once in the season, some oftener, especially in warm climates. In recent times the vine has been subject to a disease caused by the growth of a fungus known as *Oidium*. It appeared about 1845, and gradually spread over Southern Europe. Its ravages abated

VINEGAR—VIOLIN.

about 1863, but the vine has since been attacked by a still more destructive disease produced by an insect called the *Phylloxera* (which see). Grapes are extensively used in the dry state under the name of raisins, chiefly imported from Spain and the Levant. The dried currants of commerce are the produce of the small seedless Corinthian grape which is cultivated in Greece and in many of the Greek Islands. The vine is mentioned in the most ancient historical records, and the grape has been in use for the making of wine for more than 4000 years. Wine was familiar to the Greeks in Homeric times (say B.C. 1000). Vineyards existed in England long before the Norman Conquest, but in the reign of Henry II. the cultivation of the vine began to be neglected. Artificial heat was not applied to the production of grapes before the beginning of the 18th century. For the manufacture of wines see *Wine*.

Vinegar, the sour liquid formed by the acetic fermentation of dilute solutions of alcohol. The sour taste is due to the presence of acetic acid (some 5 per cent) obtained by the oxidation of the alcohol by the action of certain bacteria. In wine countries it is obtained from the acetous fermentation of inferior wines, but in Britain and elsewhere it is usually procured from an infusion of malt which has previously undergone the alcoholic fermentation. Vinegar may also be obtained from strong beer, or most liquids which have undergone alcoholic fermentation. *White vinegar* is ordinary vinegar distilled. *Wood vinegar* is an impure acetic acid obtained by the distillation of wood; called also *Pyroligneous acid*. Common and distilled vinegar are used in pharmacy for preparing many remedies, and externally in medicine, in the form of lotions. The use of vinegar as a condiment is universal. It is also used in making pickles.

Vinegar-plant, a peculiar state of the *Penicillium glaucum*, a fungus found on decaying substances, and in fluids in a state of acetification. It forms a flocculent mass, which is tough and crust-like or leathery. A small piece of this when immersed in a mixture of sugar or treacle and water produces a rather insipid kind of vinegar.

Vinet (vi-nä), ALEXANDRE RODOLPHE, a Swiss theologian and writer, born at Lausanne in 1797, died 1847. In 1817 he was appointed professor of the French language and literature at the Basel Gymnasium, in

1835 at the Basel University, and in 1837 accepted the chair of theology in the academy at Lausanne. In 1840 he seceded from the national church, maintaining that there should be no connection between church and state. His views on this subject were enforced in his *Essai sur la Manifestation des Convictions religieuses, et sur la Séparation de l'Église de l'État* (1842). In 1845 he gave up his chair. He was an earnest and eloquent preacher, and wrote *Histoire de la Littérature Française, au XVIII^e Siècle; Études sur la Littérature Française du XIX^e Siècle; &c.*

Viol, a class of ancient musical instruments which may be regarded as the precursors of the modern violins. They were fretted instruments with three to six strings, and were played on with a bow. There were three instruments differing in pitch in a set, the treble, tenor, and bass viols, and in concerts they were commonly played in pairs: two treble, two tenor, and two bass. The bass viol, or *viol de gamba*, was the last to fall into disuse, which it did about the close of last century.

Viola. See *Violin* and *Violet*.

Violaceæ. See *Violet*.

Violet (*Viola*), the popular name given to the species of the natural order Violaceæ, which are favourite flowers in all northern and temperate climates, and many of them among the first to make their appearance in the spring. The corolla is composed of five unequal petals; the roots are mostly perennial; the leaves are alternate and stipulated; and the flowers are pendunculate. More than a hundred species are known. The greatest favourites are *Viola odorata*, or common sweet violet, and *V. tricolor*, or heart's-ease; the former being especially esteemed for its fragrance. The well-known pansies so common as garden flowers are but varieties of *V. tricolor* produced by cultivation.

Violet, one of the colours. See *Colour*, *Spectrum*, &c.

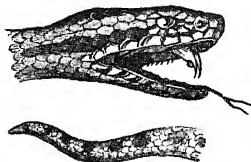
Violet-wood. See *King-wood*.

Violin, a musical instrument, consisting of four cat-gut strings, the lowest of which is covered with silvered copper wire, stretched by means of a bridge over a hollow wooden body, and played with a bow. It is considered the most perfect of musical instruments, on account of its capabilities of fine tone and expression, and of producing all the tones in any scale in perfect tune. It forms with its cognates, the viola, violoncello

or bass violin, and double-bass, the main element of all orchestras. The principal parts of the violin are the *scroll* or *head*, in which are placed the pins for tuning the strings; the *neck*, which connects the scroll with the body, and to which is attached the *finger-board*, upon which the strings are stopped by the fingers of the left hand as it holds the neck in playing; the *belly*, over which the strings are stretched, and which has two *f*-shaped sound holes, one on each side; the *back* or under side; the *sides* or *ribs*, uniting the back and belly; the *tail-piece*, to which the strings are fastened; and the *bridge*. The back, neck, and sides are generally of sycamore, the belly of deal, the finger-board and tail-piece of ebony. Almost all the different pieces are fastened together with glue. The four strings of the violin are tuned at intervals of fifths, G, on the upper space of the bass staff, D, A, E, reckoning upwards. Every intermediate semitone in its ordinary compass of $3\frac{1}{2}$ octaves may be produced by stopping the strings with the fingers, and the compass may be almost indefinitely extended upwards by the harmonics produced by touching the strings lightly. The *viola*, or tenor violin, has four strings tuned C (in the second space of the bass staff), D, A, G, reckoning upwards, and is an octave higher than the violoncello, and a fifth lower than the violin. (See *Violoncello* and *Contrabasso*.) The violin can, to a limited extent, be made to produce harmony by sounding two or three strings together. The finest violins are by old makers, which cannot be imitated, and the precise cause of their superiority has never been satisfactorily explained. The Cremona violins stand in the first rank, the celebrated makers being the Stradivari (Stradivarius), Amati, and Guarneri (Guarnerius); of German makers the most celebrated are Stainer or Steiner and Klotz; Vuillaume of the French, and Forrest of the English.

Violoncello, a powerful and expressive bow instrument of the violin kind, held by the performer between the knees, and filling a place between the violin and double-bass. It has four strings, the two lowest covered with silver wire. It is tuned in fifths, C (on the second ledger-line below the bass staff), G, D, A, reckoning upwards, and is an octave lower than the viola or tenor violin. Its ordinary compass from C on the second ledger-line below extends to A on the second space of the treble, but soloists frequently play an octave higher.

Viper, a name applied to various venomous serpents belonging to the family Viperidae, sub-order Viperina, and characterized, like other members of that section, by having no teeth in the upper jaw save the two hollow poison-fangs. The common viper or adder



Head and Tail of Common Viper (*Pelias berus*).

(*Pelias berus* or *Vipera communis*), the only venomous serpent which occurs in Britain, appears to be very local in its distribution. It is generally of a brownish-yellow colour, with zigzag markings and black triangular spots. Its bite is, as a rule, not fatal, but may induce pain, sickness, and fever. The food consists of frogs, mice, birds, eggs, &c. The viper is viviparous—retaining its eggs within the body till the young are hatched. Among other serpents denominated vipers are the black viper (*Heterodon niger*) of North America; the death viper or adder (*Acanthophis antarctica*) of Australia; the horned viper or asp (*Cerastes Hasselquistii*) and plumed viper (*Ophiophagus*) of North Africa.

Virchow (fär'hō), RUDOLF, German pathologist and anthropologist, born 1821, studied medicine at Berlin, and early became famous as a lecturer on pathological anatomy at Berlin University. His advanced liberal opinions during the movement of 1848 induced the government to deprive him (temporarily) of his appointment. In 1849 he accepted a chair at Würzburg, where he remained seven years, returning to Berlin in the autumn of 1856 as professor in the university and director of the pathological institute attached to it. He has rendered immense service to medical science by his discoveries in regard to inflammation, ulceration, tuberculosis, and numerous other morbid processes of the human body, and has had great influence on the whole of modern medicine, including hospital reform and sanitary science. From 1862 he was one of Bismarck's most powerful opponents in the Prussian parliament and the Reichstag, and he was a member of important commissions, &c. In 1873 he was elected a

VIRGIL—VIRGINIA.

member of the Berlin Academy of Sciences. He visited England several times; in 1893 delivered the Croonian Lecture before the



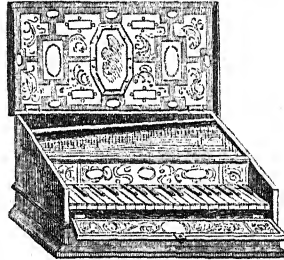
Rudolf Virchow.

Royal Society, in 1898 the Huxley Lecture at Charing Cross Hospital. He was one of the founders of the German Anthropological Society, and was long a hard worker in this field, accumulating facts (partly in company with Schliemann) in Asia Minor, the Caucasus, Egypt and Nubia, &c. He has been a voluminous writer, and among his important works are: *Cellular Pathology* (4th ed. 1871, translated into various languages), *Handbuch der Speziellen Pathologie und Therapie* (6 vols. 1854-76), *Über den Hungertyphus* (1868), *Die Aufgabe der Naturwissenschaften in dem neuen nationalen Leben Deutschlands* (1871), *Die Freiheit der Wissenschaft im Modernen Staat* (Berlin, 1877), and many others. Most of his medical works have been translated into English. He died in Sept., 1902.

Virgil, full name, PUBLIUS VIRGILIUS (or VERGILIUS) MARO, the most distinguished epic, didactic, and pastoral poet of ancient Rome, was born at Andes (probably *Pietola*), a little village near Mantua, 15th October, 70 B.C. His father possessed a farm there, which he cultivated himself, and Virgil received a good education. He appears to have come to Rome about 41 or 40 B.C., when his estate was lost at the time of the agrarian division. It was restored to him, however, on application to Augustus, who henceforward became his patron. He also enjoyed the patronage of Mæcenas, and was intimate with Horace. His health was delicate, and his retiring nature led him to reside for the most part outside Rome, either at Tarentum

or Naples. His *Eclogues*, a series of bucolic or pastoral poems, were written about 41-39 B.C. His *Georgics*, a poem on agriculture, was completed in B.C. 31. The *Æneid*, an epic in twelve books on the fortunes of Æneas (which see), was probably begun about B.C. 29. It occupied the author many years, and never received his finishing touches. In B.C. 20 Virgil appears to have engaged on a tour in Greece. But Augustus, having arrived at Athens on his return from the East, Virgil determined to accompany him home. At Megara, however, he fell sick, and he died at Brundisium, B.C. 19. His poems exhibit a remarkable command of language, and great taste and skill in the management of all the materials of poetry. He is unrivalled in beauty of versification. He was amiable and modest, free from envy and jealousy, and of irreproachable character. Mediæval legends represent him as a benevolent enchanter, in which character many stories were current regarding him in Italy.

Virginal, an obsolete keyed musical instrument with one string, jack and quill to each note. It differed from the spinet only in being square instead of triangular, and



Virginal.

was the precursor of the harpsichord, now superseded by the pianoforte.

Virginia. See *Appius Claudius*.

Virginia, one of the original of the United States of North America, bounded by West Virginia, Maryland, the Atlantic, North Carolina, Tennessee, and Kentucky; area, 42,450 square miles. The western portion of the state is traversed from S.S.W. to N.N.E. by the great range of the Alleghanies, with ramifications known by various local names, and intersected by extensive and fertile valleys. The surface of the state may be divided into three sections: the seaboard or tide-water district, the soil of which

VIRGINIA — VISCACHA.

is of excellent quality, yielding large crops; the district to the eastern chain of the Alleghanies, which is less fertile; and the mountain district, which has many rich and fertile valleys. The Valley of Virginia in this district has been called the garden of America. The width of the mountainous district is from 80 to 100 miles. The highest point is White Top, about 6000 feet above sea-level. The sea-board or tide-water district is generally level, not exceeding 60 feet above the tide in its highest parts. Virginia is rich in minerals, including coal, iron, copper, lead, manganese, zinc, gold, gypsum, rock-salt, &c.; the most valuable of those worked being coal and iron. The chief rivers are the Potomac, the Rappahannock, the York, and the James, which flow into Chesapeake Bay. The Roanoke passes into North Carolina. The staple products of Virginia are tobacco, Indian corn, wheat, and oats. Cattle and sheep are numerous, and dairy produce is exported. The largest exports are tobacco and flour. Elementary and intermediate education is free to all; advanced instruction is free to a certain number; and the higher instruction of the University of Virginia is free to all male natives over eighteen years of age who possess a certain standard of culture. The chief cities of the state are Richmond (the capital), Norfolk, Petersburg, Lynchburg, Alexandria, and Portsmouth. Virginia was first settled at Jamestown in 1607 and 1609 by chartered London companies. It was made a royal colony in 1624, and continued a loyal royal province till the Revolution. Negro slavery was introduced in 1619, and for a considerable period after that date felons or convicts were sent over from England in large numbers, and sold for a term of years for work on the plantations. Its capital, Richmond, was the capital of the Confederate States, and during the whole of the civil war the state was occupied by hostile armies. At the close of the war the state was under military control till 1870, when it was readmitted to the Union. Pop. 1,854,184.

Virginia, West, one of the United States of North America, bounded by Ohio, Pennsylvania, Maryland, Virginia, and Kentucky; area, 24,780 square miles. The country is generally hilly and mountainous, and is traversed by spurs of the Alleghanies. The chief rivers are the Ohio, with its affluents the Great and Little Kanawha, and the Big Sandy River. There are lead, iron, coal, and salt mines. The climate is

mild and healthy, and the soil generally productive. Indian corn, wheat, oats, potatoes, and butter are the chief productions. West Virginia was created a state during the civil war (1863). At the outbreak of the war a convention met at Wheeling (now the largest town in the state), and repudiated the acts of the Richmond convention, which went for the Confederate cause. During the war West Virginia furnished 30,000 troops to the Federal army. The capital is Charleston. Pop. 958,800.

Virginia City, the capital of Storey county, Nevada, United States. It was at one time the chief mining centre of the Pacific coast, the famous Comstock Lode being here. Pop. 3000.

Virginian Creeper, the *Ampelopsis hederacea*, a climbing plant, native to North America, used as an ornamental covering for walls, &c., and sometimes called *American Ivy*. Its leaves turn a bright red in the autumn.

Virginian Deer. See *Cariacou*.

Virginian Quail. See *Quail*.

Virginia University, near Charlottesville, Virginia, was chartered in 1819, and opened in 1824 under the rectorship of Thomas Jefferson. It enjoys state patronage, receives an annual grant of money, and has a library containing 50,000 volumes. It consists of a number of schools, each of which confers degrees for proficiency, but no general curriculum is prescribed.

Virgin Islands, a group of small islands in the West Indies, belonging to Britain, Denmark, and the United States, and situated east of Porto Rico. The chief exports are sugar, molasses, rum, cotton, and salt. The chief British islands are Tortola, Anegada, and Virgin Gorda; Denmark has St. Thomas, Santa Cruz, and St. John; Culebra, Crab Island, &c., belong to the United States. The British area is 64 sq. miles; the pop. 4908. The capital is Roadtown, on Tortola. The British islands are administered by a president under the governor of the Leeward Isles. The group was discovered by Columbus in 1494.

Virgin Mary. See *Mary*.

Virgin's Bower. See *Clematis*.

Viscacha (vis-ká'chá; *Lagostomus trichodactylus*), a rodent animal of South America, allied to the chinchilla, about 2 feet long and stoutly built, with a short tail, inhabiting the pampas of the Argentine Republic, and living in burrows like the prairie-dog of North America.

Vischer (fish'ér), PETER, German sculptor, born at Nuremberg, Bavaria, in 1455, son of a worker in bronze. Little is known of his private life, but he attained great fame as an artist, and received orders both from Germany and foreign princes. His most celebrated work is the tomb of St. Sebaldus in Nuremberg, which contains seventy-two figures, besides those of the apostles and prophets. He died at Nuremberg in 1529.

Visconti, an old Milanese family, celebrated for its political consequence and its patronage of science. The family reached the summit of its grandeur and splendour in the reign of Gian Galeazzo, who assumed the government in 1385.

Viscount (vî'kount), a title of nobility next in rank to that of earl, and immediately above that of baron. It is the most recently established English title, having been first conferred by letters patent on John, Lord Beaumont, by Henry VI. in 1440. The title is frequently attached to an earldom as a second title, and is held by the eldest son during the lifetime of the father. See *Britain (Ranks and Titles)*, *Coronet*.

Vishnu, the second god of the Hindu triad (the others being Brahma and Siva), and by his special worshippers considered to be the greatest. In the early Vedas he appears as a manifestation of the sun, and he was not regarded as the most exalted deity, this rank being accorded to him by the later writers of the Rāmāyana, the Mahābhārata, and more especially of the Purāṇas. The Brahmanic myths relating to Vishnu are characterized by the idea that whenever a great physical or moral disorder affected the world, Vishnu descended in a small portion of his essence to set it right. Such descents are called *avatars*, or incarnations, and are generally given as ten, nine of which are already past, the tenth being yet to come. He is generally represented as having four arms, each hand holding some particular object, and as riding on a being half man half bird.

Visible Speech, a term applied by Prof. A. Melville Bell, its inventor, to a system

of alphabetical characters designed to represent every possible articulate utterance of the organs of speech. The system is based on an exhaustive classification of the possible actions of the speech organs, each organ and every mode of action having its appropriate symbol. It is said that this invention is of great utility in the teaching of the deaf and dumb to speak, and in enabling learners of foreign languages to acquire their pronunciation from books.

Visigoths. See *Goths*.

Vision. See *Eye*, *Optics*, *Sight*.

Viś'tula (German, *Weichsel*, vik'sél), a river which rises in the Carpathians, traverses Galicia, Poland, and Prussia, and after a course of about 650 miles empties by several mouths into the Gulf of Danzig. It flows past the towns of Cracov, Warsaw, Bromberg, and Danzig, and is navigable from the first-mentioned place.

Vitaceæ. See *Vine*.

Vitalians. See *Apollinarians*.

Vitebsk'. See *Vitepsk'*.

Vitel'line, a substance consisting of casein and albumen, forming the nutritive part of the yolk of birds' eggs.

Vitellius, AULUS, a Roman emperor, remarkable only for his gluttony. He was appointed commander of the legions in Lower Germany by Galba, and on the death of the latter he was proclaimed emperor by his troops (Jan. 26, 69 A.D.). Six months later Vespasian was called to the throne, and Vitellius was deposed and executed (Dec. 22, 69).

Vitepsk', or **VITEBSK'**, a town in Russia, capital of the government of the same name, on the Dvina, 315 miles s. of St. Petersburg. The streets are narrow and dirty, and the houses mostly built of wood. Its manufactures are woollen and linen cloth, leather, and mead. It has a considerable trade. Pop. 66,143.—The government has an area of 17,433 square miles. The surface is generally flat, and much occupied by woods and morasses. The whole drainage is carried to the Baltic. The soil suits rye better than any other grain. The only mineral of value is iron. Pop. 1,503,000.

Viter'bo, an old walled town of Italy, in a fertile valley in the province of Rome, 40 miles north-west of Rome. It has an old Romanesque cathedral containing the tombs of several popes, an old episcopal palace, and an old town-hall. Pop. 19,000.

Viti Levu, the chief island of the Fiji group. See *Fiji*.



Vishnu on his Man-bird Garuda.

Vitis, the typical genus of the order Vitaceæ, comprising the vines (which see).

Vitoria, a town of Spain, in Biscay, capital of the province of Alava, 65 miles N.E. of Burgos. The chief buildings are the churches, the provincial palace of deputies, an academy of music, theatre, and prison. Here, on the 21st June, 1813, Wellington defeated the French under King Joseph and Marshal Jourdan. Pop. 33,600.

Vitrified Forts, the name given to certain prehistoric hill fortresses principally found in Scotland, and formed of stones heaped together. The materials of which they are constructed are perfectly or partially vitrified or transformed into a kind of glass by the action of heat. It is now generally believed that the vitrification was intentional, being effected by means of piled-up fuel.

Vitriol, BLUE. See *Copper*.

Vitriol, GREEN, the same as copperas or sulphate of iron. See *Copperas*.

Vitriol, OIL OF, the common name for strong sulphuric acid (which see).

Vitruvius Pollio, MARCUS, a celebrated Latin writer on architecture, who flourished in the time of Julius Cæsar and Augustus, and wrote his work *De Architectura* probably about B.C. 13. This treatise is valuable as a compendium of those of numerous Greek architects.

Vitry-le-François (*-frān-sā*), a fortified town of France, dep. Marne, on the river Marne. Pop. 8600.

Vittoria. See *Vitoria*.

Vitus's Dance, St., or Chorea, a spasmodic or convulsive disease, allied to rheumatism, and due to an irritable condition of the spinal cord, in which the muscles of the extremities and other parts are thrown into various involuntary motions, and perform in an irregular manner those motions which are dictated by the will. The disease attacks both sexes, but chiefly the female, and is specially a disease of childhood, occurring in those who are of a weak constitution or improperly nourished. It generally appears from the eighth to the fourteenth year. In serious cases the spasmodic movements are violent and incessant, and speech and swallowing are interfered with.

Viveridæ, a family of mammals containing the civets and allied tribes.

Viviparous Animals, animals which bring forth their young alive. See *Reproduction*.

Vivisection, the practice of operating with the knife upon living animals for the purpose of ascertaining some fact in physiology

or pathology which cannot be otherwise investigated. It is also practised in order to illustrate previously known facts, and to enable students to acquire operative dexterity. Vivisection for the latter purpose is generally condemned in Great Britain, but is carried on in the veterinary colleges in France. By an act passed in 1876 (39 and 40 Vict. cap. lxxvii.) no painful experiment can be performed upon any living vertebrate animal except by a person holding a conditional license from a secretary of state, and it must be performed in a registered place, and the animal must be rendered insensible by an anæsthetic. If the animal is likely to suffer pain on regaining sensibility, it is to be killed before it recovers from the influence of the anæsthetic. Dogs, cats, horses, asses, or mules are never to be experimented upon unless no other animal can be used without frustrating the object of the experiment. Though the term vivisection strictly is applicable to cutting operations only, it is generally employed for all scientific experiments performed on living animals, whether they consist of cutting operations, the compression of parts by ligatures, the administration of poisons, the inoculation of disease, the subjection to special conditions of food, temperature, or respiration, or to the action of drugs and medicines.

Vizagapatam, a town of British India, Madras Presidency, at the entrance of the Veragatam into the Bay of Bengal. It is a military station and has a good harbour. Pop. 40,892.

Vizier (Arabic, *wazir*, a bearer of burdens), a title given to high political officers in the Turkish Empire and other Mohammedan states. In Turkey the title is given to the heads of the various ministerial departments into which the divan or ministerial council is divided. The president of the divan or prime minister is known as grand vizier, *vizier-azam*, or *sadr-azam*.

Vlaardingen, a town of the Netherlands, prov. of S. Holland, on the New Maas, a seat of the Dutch herring fishery. Pop. 16,800.

Vladikau'kas, a town of Russia, capital of Terek district, at the northern base of the Caucasus. Pop. 43,843.

Vladimir (*vlád-e'mér*), one of the oldest towns in Russia, capital of a government of the same name, 105 miles N.E. of Moscow. It has a cathedral, a theological seminary, considerable manufactures, and a trade in fruit. During the 13th century it rivalled Moscow in importance, but began to decay in the

following century. Pop. 28,300. — The government has an area of 18,794 square miles, and a population of 1,570,800. It is not very fertile, and is drained by the Oka and its tributary the Kliasna. There are important manufactures of linens and woollens, and several blast-furnaces.

Vladivostock, a Russian seaport in Eastern Siberia, Sea of Japan, a terminus of the great Siberian Railway. It was founded in 1861, and is a station of the Russian Pacific fleet. Vast sums have been spent on fortifications, wharves, ship-yards, arsenals, &c. Pop. 38,000.

Viessingen. See *Flushing*.

Vocal Chords or Cords. See *Voice* and *Larynx*.

Vogel (vō'gl), SIR JULIUS, Australasian statesman and journalist, born in London 1835. He went to Melbourne during the gold rush, and after being engaged in business and on the gold-fields, devoted himself to journalism. He afterwards went to Dunedin, became newspaper proprietor and editor, was elected a member of the N.Z. House of Representatives, held ministerial office frequently, for some time as premier, and was agent-general in London from 1876 to 1881. He established the first daily newspaper in New Zealand, and was connected with most contemporary public enterprises of the colony, from which he latterly retired to reside in England. He was knighted in 1875. He died in 1899.

Voice, the name given to the result of the production of sound in nearly all higher vertebrate animals. 'Speech' (which see) is a modification of 'voice.' In man the voice is produced by the *inferior laryngeal ligaments* or *true vocal cords* (see *Larynx*) as they are termed. The vocal cords consist of two elastic folds of mucous membrane, so attached to the cartilages of the larynx and to muscles, that they may be stretched or relaxed and otherwise altered so as to modify the sounds produced by their vibration. The higher the note produced the greater is the tension of the cords; and the range of voice therefore depends upon the amount of tension which the cords can undergo. Regarding the compass and application of the voice in speaking and singing physiologists have noted three kinds of sequence. In ordinary speaking a monotonous sequence is observed, the notes having nearly all the same pitch, and the variety of the sounds being due rather to articulation in the mouth than to definite movements of the glottis

and vocal cords. A passage from high to low notes, without intervals, forms the second kind of sequence; or the same sequence is observed in the passage from low to high notes. Such a sequence is exemplified in crying and howling both in man and in lower animals. The true *musical* sequence forms the third, in which the successive sounds have vibrations corresponding in relative proportions to the notes of the musical scale. The male voice admits of division into tenor and bass, and the female into soprano and contralto. The lowest female note is an octave or so higher than the lowest note of the male voice, and the female's highest note is about an octave above that of the male. The compass of both voices taken together is about four octaves, the chief difference residing in the pitch and also in the quality or *timbre*. The difference of pitch between the male and female voice is due to the length of the vocal cords, whilst the difference in timbre appears to result from differences in the nature and extent of the walls and cavity of the larynx, throat, and mouth. *Chest notes* differ from *falsetto notes* in that the former are natural notes produced by the natural voice, while the latter are produced by a stopping action on the cords. Finally it may be noted that the actual *strength* of the voice depends on the degree of vibration of the vocal cords, and also in a minor degree on the resonance of the larynx, lungs, and chest generally.

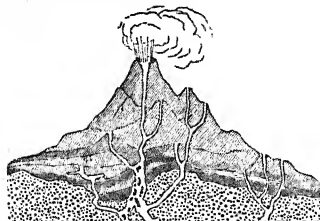
Volapük (vō'la-pük) the name given to a universal language invented by Johann Martin Schleyer, of Constance, after twenty years labour. The name means 'world-speech,' being based on English *world* and *speak*, and a number of the vocables are modified English words. In structure the language is simple and extremely regular, and the orthography is entirely phonetic, the words being pronounced as they are written, and *vice versa*. The study of Volapük has made some progress; there are a number of periodicals written in it, and many associations devoted to its dissemination.

Volatile Oils. See *Oils*.

Volcanoes, in a popular sense, conical hills or mountains composed of material (volcanic ashes and lava) brought up by igneous forces from the interior of the earth through a pipe or vent. At the top there is a cup-shaped hollow called the crater. A volcanic eruption generally commences with the discharge of immense quantities of gases. This is followed by the ejection of ashes and

VOLCANOES — VOLE.

hot fragments of rock. Lastly there is a flood of molten rock or lava. Volcanoes which show such outbursts more or less frequently are called *active* volcanoes; those



Section of an active Volcano.

which are known to have been active in historic times, but have long been quiescent, are called *dormant* or *sleeping* volcanoes; and those which present all the phenomena of volcanoes, but which have shown no activity in historic times, are called *extinct* or *dead* volcanoes. The mud volcanoes or *salses* of the Crimea and elsewhere (conical hills of slowly-flowing mud); the *fumaroles* (fissures from which steam issues); the *solfataras* (holes from which sulphurous fumes proceed) of Italy, &c.; the geysers and hot springs of Iceland, New Zealand, the Yellowstone Park, &c., are signs of weak or decreasing volcanic activity in the special districts in which they occur. Volcanoes may occur as isolated conical mountains, such as Vesuvius, Etna, or the Peak of Teneriffe. They also form various groups or systems of mountains. One remarkable fact in the distribution of volcanoes is their proximity to the sea, for out of 323 active volcanoes enumerated by Fuchs, all, excepting two or three in Central Asia and about the same number in America, are within a short distance at least of the ocean. There are certain regions over the whole of which active volcanic vents are distributed at intervals. Of these great regions that of the Andes is one of the best defined. An almost uninterrupted line of volcanoes stretches from the 46th degree of s. lat. in Chili to the north of Mexico, including Tunguragua, Cotopaxi, Antisana, Pichincha, Orizaba, Popocatepetl, Jorullo, &c. Another continuous line of volcanic action commences in the north of Alaska, passes through the Aleutian Isles over to Kamtchatka in N. E. Asia, then proceeds southward without interruption through a space of between 60° and 70° of latitude to the Moluccas. It includes the

Kurile, Japanese, and Philippine Islands, traverses Java, Sumatra, Borneo, Celebes, New Guinea, and extends to various parts of the Polynesian Archipelago and New Zealand. In the Old World the volcanic region extends from the Caspian Sea to the Azores, embracing the greater part of the Mediterranean and especially some of its islands. Here volcanic action is most prominently visible in Vesuvius, Etna, and the Lipari Islands. Among disconnected volcanic groups may be mentioned Iceland (Mt. Hecla, in particular), the Sandwich Islands, Réunion or Bourbon, and Martinique and St. Vincent, in the W. Indies, where an outburst in 1902 caused most lamentable destruction of life and property. (See *Vesuvius, Etna, Hecla, Krakatoa, &c.*) Submarine volcanoes show a frequent existence, but such phenomena are for the most part inaccessible. In the 19th century several instances of the rise and disappearance of islands owing to volcanic action have been observed. Various theories have been proposed to account for the immediate cause of volcanic action. It is now generally accepted that it is produced by internal heat at a certain depth beneath the surface of the earth, and the evolution of a great body of elastic vapour, expanding and seeking to escape where the least amount of resistance is presented, and manifesting itself in the explosions that accompany an eruption, or in the upheaval of rocks and the production of earthquakes. See also *Earth, Geysers, Earthquakes, &c.*

Vole (*Arvicola*), a genus of rodents closely allied to the rats and mice, and included in



Common Vole (*Arvicola agrestis*)

that family. Some are terrestrial, others aquatic. The common vole of Britain (*A. agrestis*), the meadow-mouse, or short-tailed field-mouse, is injurious to young plant-

tions and pastures, sometimes appearing in immense multitudes. It is reddish-brown above and gray below. The water-vole (*A. amphibius*) or water-rat is much larger, and swims well though its feet are not webbed. It is of a pale or chestnut brown, tinted with gray. A black variety of the water-vole is common in Britain. There are many other species of voles in the Old and the New World.

Volga, a river in Russia, the longest in



Europe; rising in a small lake in the east of the Valdai Hills, and falling into the Caspian Sea by about seventy mouths, near Astrakhan, after a total estimated course of 2400 miles. Its basin is estimated at from 500,000 to 700,000 square miles. It flows generally south-east past Tver, Yaroslav, Kostroma, and Nijni-Novgorod to Kasan, thence south past Simbirsk and Saratov, and proceeds south-east from Sarepta to the Caspian. Its chief tributaries are the Kama on the left bank and the Oka on the right. It is navigable by barges from its source, and communicates with the Black, Baltic, and Polar Seas by a series of canals. Its banks are fertile and well-wooded, and its waters abound in fish, particularly sturgeon, carp, and pike of extraordinary size.

Volhynia, a government in south-west Russia; area, 27,723 square miles. The soil is fertile, producing all kinds of grain, particularly wheat; and fine breeds of cattle and horses are reared. The hills in the south are rich in iron. There are also considerable manufactures. The capital is Jitomir. Pop. 3,309,000.

Volition. See *Will*.

Volo, a seaport of Greece, Thessaly, on the Gulf of Volo, connected by railway with Larissa (37 miles). Pop. 16,232.

Vologda, a government in north-east Russia; area, 155,033 square miles. Its forests furnish quantities of timber and charcoal. Pop. 1,366,600.—The capital is **VOLOGDA**, on a river of same name, 35 miles E.S.E. of St. Petersburg. Pop. 17,391.

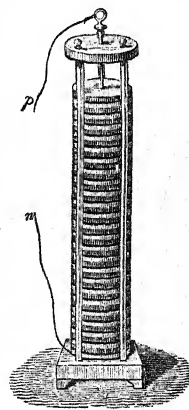
Volsci (vol'si) an ancient Italian tribe who dwelt in Latium, on both sides of the river Liris (Garigliano). Their principal city was Corioli, from which Coriolanus derived his surname. After having several times endangered the Roman state they were conquered, and disappeared from history (338 B.C.).

Volta, **ALESSANDRO**, Italian natural philosopher, born at Como in 1745, and died there in 1827. Two treatises, published in 1769 and 1771, in which he gave a description of a new electrical machine, laid the foundation of his fame. He was successively professor of physics at the gymnasium in Como and in the University of Pavia, where he invented the electrophorus and electroscope. He also devised several other electrical appliances, and in 1800 the voltaic pile (which see). In 1782 he made a tour through France, Germany, England, and Holland. In 1801 Napoleon invited him to France, where a medal was struck in his honour. In 1810 he was created a senator of Italy, with the title of count; and in 1815 was made director of the philosophical faculty of Padua.

Voltaic Electricity, galvanic electricity, galvanism. See *Galvanic Battery* and *Galvanism*.

Voltaic Pile, Volta's arrangement for producing a current of electricity, consisting of a pile of alternate discs of two dissimilar metals, as copper and zinc, zinc and silver, zinc and platinum, separated by pieces of flannel or pasteboard moistened with salt water or with water acidulated with sulphuric acid.

Voltaire, **FRANÇOIS MARIE AROUET DE**, French writer, born at Paris, November 21,



Voltaic Pile.
p positive, z negative end.

1694; died there May 30, 1778. His father was François Aronnet, a notary, and he was destined for the legal profession, but abandoned the law for letters. In 1718 a tragedy named *Œdipe* was brought out by him, and was a great success. It is said that this play was finished, and that two cantos of his epic the *Henriade* were written in the Bastille, where he was confined from May 1717 to April 1718, for writing certain satirical verses on the regent. He now became the fashionable poet and resided mainly at Paris, leading a life of gaiety and pleasure in the society of the great. It was about the beginning of this period that he adopted the name of Voltaire. In 1726 he was again imprisoned in the Bastille for sending a challenge to the Chevalier Rohan, by whom he had been grossly insulted. He was liberated within a month, and came to England on the invitation of Lord Bolingbroke. Here he resided till 1729 in friendship with the leading deists, and acquired some knowledge of English literature. His *Henriade* was completed and published by subscription in England. After his return to France he lived chiefly at Paris till 1734. During this period he raised himself from very moderate circumstances to a condition of affluence by successful monetary speculations. From 1734 to 1749 he resided with the Marchioness de Châtelet at Cirey, in Lorraine. She died in 1749, and Voltaire then accepted the oft repeated invitations of Frederick the Great to come and live at his court at Potsdam. Here he was received with great honour, but a series of disagreements with the king ended in Voltaire's retirement from the Prussian court in 1753. He then resided for a short time at Strasbourg, Colmar, and Lyons, removing at the end of 1754 to Geneva. For almost the whole of the remainder of his life he lived in Switzerland, or close to its borders. In 1760 or 1761 he fixed his residence with his niece, Madame Denis, at Ferney, where he received a constant succession of distinguished visitors, and maintained a correspondence which included in its range most of the crowned heads of Europe. In Feb. 1778 he went to Paris, where he was received with enthusiasm by all classes. But the excitement of the occasion hastened his death. His works embrace almost every branch of literature; poetry, the drama, romance, history, philosophy, and even science. Hatred of fanaticism and superstition was his chief characteristic, and nearly all his

works are strongly animated by a spirit of hostility to the priests and the religion they represented. He upheld theism, however, with as much zeal as he denounced Christianity and priestcraft. Voltaire's literary fame chiefly rests on his philosophical novels: *Zadig*, *Candide*, *L'Ingénu*, &c.; his histories: *Siècle de Louis XIV.*, *Histoire de Charles XII.*; his correspondence; and more than all, perhaps, on his poetical epistles, satires, and occasional light poems, which all exhibit wit, gaiety, vivacity, and grace. Several of his tragedies, such as *Zaire*, *Alzire*, *Merope*, *Mahomet*, had great success in their day, but are not assigned a high place in French literature. His comedies, the best of which is *L'Enfant Prodigue*, were less successful. His *Henriade*, an epic poem, had great success, and exercised a powerful influence when it first appeared, but is not highly esteemed now.

Volta'm'eter, an instrument in which a current of electricity is made to pass through slightly acidulated water, and as the water is thus decomposed, oxygen and hydrogen being liberated, the quantity of electric current passing through in a given time may be ascertained in terms of the quantity of water decomposed.

Volterra (ancient *Volaterræ*), a town in Italy, prov. of Pisa, 33 miles south-west of Florence. It was anciently one of the twelve principal cities of Etruria, is surrounded by Etruscan walls, and possesses a museum rich in Etruscan antiquities. Pop. 5347.

Volterra, DANIELE DA. See *Ricciarelli*.

Volturno, a river of Italy, rising in the province of Campobasso, flows S.E. to its junction with the Calore, and then west past Capua into the Mediterranean, 20 miles S.E. of Gaeta. Course, 90 miles.

Voluntaryism, the principle of that ecclesiastical party which denies to the state the right of interfering in matters of religion, which asserts that the church should be supported only by the voluntary contributions of its members, who should be left entirely free to regulate its affairs, and which demands that all churches should be placed on an equal footing in the eye of the law.

Volunteers, citizens who of their own accord offer the state their services in a military capacity without the stipulation of a substantial reward. The oldest volunteer force in Great Britain is the Honourable Artillery Company of the city of London, which received its charter of incorporation from Henry VIII. In 1794, and again in

1803, when the ambition and threats of France agitated England, the government reckoned upon having nearly 500,000 efficient volunteers in arms. The numbers soon declined, and in 1815 the force almost ceased to exist. About 1857 a feeling of insecurity began to manifest itself in consequence of the alleged insufficiency of the national defences, and the Victoria Rifles and one or two other corps were formed. In the course of two or three years many thousands of volunteer riflemen were enrolled throughout the kingdom. An act of parliament relating to the force was passed in 1863; another was passed in 1869, and these, with subsequent acts and regulations, constituted the law relating to the volunteers. There were also corps of artillerymen, engineers, medical staff, &c., as part of the force. Government provided the arms and part of the ammunition, and allowed for each efficient rifleman an annual capitation grant of 35s.; an additional annual grant of 50s. being made for each officer or sergeant holding a certificate of proficiency. Uniforms, drill-halls, ranges, &c., had to be provided out of the capitation grants or otherwise. In connection with the volunteers a National Rifle Association was formed in 1860, which inaugurated the great annual shooting matches held till 1889 at Wimbledon, afterwards at Bisley, near Woking. This was followed by a National Artillery Association, with annual meetings at Shoeburyness. Other organizations included a volunteer marine mining corps for the protection of the ports of the kingdom. Latterly the volunteer force had an actual effective strength of about 250,000 men. Under the Territorial and Reserve Forces Act (1907) the volunteers have disappeared as such, and have been largely absorbed in the Territorial Army, with enlistment for one to four years, annual training in camp, &c. All the British colonies depend partly on volunteers as a defensive force, and in Australia and other colonies the nucleus of a small standing army has been formed from the body.

Volute, in architecture, a kind of spiral scroll used in the Ionic, Corinthian, and Composite capitals, of which it is a principal ornament. The number of volutes in the Ionic order is four. In the Corinthian and Composite orders they are more numerous, in the former being accompanied with smaller ones, called *helices*. See *Composite Order*, *Corinthian Order*, *Ionic Order*.

Vomer, in anatomy, one of the bones of

the skull, forming in man part of the septum or division between the cavities of the nostrils. In fishes it is a feature of importance for classification purposes.

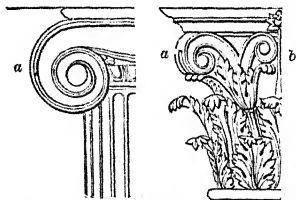
Vomiting, the forcible expulsion of matters from the stomach through the cesophagus or gullet. It is a symptom common to numerous diseases. At times it is sympathetic, as in affections of the kidneys, uterus, brain, &c. At others it is symptomatic, as in gastritis, peritonitis, &c.

Vondel, JOOST VAN DEN, one of the most celebrated poets of Holland, born in 1587, died in 1659. His works display so much genius and elevated imagination that he has been called the Dutch Shakspeare. They include metrical versions of the Psalms, of Virgil, and of Ovid, together with satires and tragedies. Of the latter *Palamedes*, the *Conquest of Amsterdam*, and *Lucifer* are considered the masterpieces of Dutch tragedy. Alleged close resemblances in the latter to Milton's *Paradise Lost* have caused some discussion. Vondel also excelled as a lyric poet.

Vorarlberg, a western district of Austria-Hungary, officially included in the Tyrol. Area, 1005 square miles; pop. 180,000.

Voronej, a town of Russia, capital of the government of the same name, on the Voronej, 290 miles S.S.E. of Moscow. It is an important entrepôt on the railway between Moscow and the Sea of Azov. It has manufactures of woollen and linen cloth, soap, and vitriol, tanneries, and a considerable trade. Pop. 84,146. —The government has an area of 25,440 square miles, and a pop. of 2,546,255. It is intersected by the Don, which receives the whole of the drainage, partly through its tributaries the Voronej and Khoper. The soil is generally fertile, and large crops of grain are raised.

Vortex, the form produced when any por-



Volutes of the Ionic and Corinthian Capitals.
a a, Volute. b, Helix.

tion of a fluid is set rotating round an axis. Familiar examples are seen in eddies, whirl-

pools, waterspouts, whirlwinds, and on a larger scale in cyclones and storms generally. Descartes supposed certain vortices to exist in the fluid or ether of space endowed with a rapid rotatory motion about an axis, and filling all space, and by these he accounted for the motions of the universe.

Vortex Ring, in physics, a vortical molecular filament or column returning into itself so as to form a ring composed of a number of small rotating circles placed side by side, like beads on a string, as the singular smoke-rings which are sometimes produced when a cannon is fired, or when a smoker skilfully emits a puff of tobacco smoke. Recent investigations of the motion of vortices have suggested the possibility of founding on them a new form of the atomic theory.

Vorticella, or 'BELL-ANIMALCULE,' a genus of stalked infusoria, having a fixed stem capable of being coiled into a spiral form,



Vorticellin.

and vibratile organs called cilia fringing the bell-shaped disc or head, which are constantly in rapid motion and attract particles of food. The species are very numerous in fresh water, and are generally microscopic.

Vosges (vöz), a chain of mountains about 100 miles long, extending N.N.E. to S.S.W. along the frontiers of France and Alsace, nearly parallel with the Rhine. The breadth varies from 20 to 45 miles, and the highest peak is Ballon-de-Guebwiller, 4685 feet. Great part of the Vosges is densely wooded, and the eastern and southern slopes are often covered with vineyards. There is also excellent pasturage. The Ill, Lauter, Moselle, Meurthe, Saar, and Saône rise in this chain.

Vosges, an eastern frontier department of France; area, 2268 square miles. It is bounded on the east by the Vosges Mountains, which send out ramifications over the greater part of its surface, whilst in the south it is traversed by the chain of the

Faucilles. Grain, hemp, flax, and potatoes are extensively grown, and the department is famous for its kirsch-wasser. The principal rivers are the Meuse, Mouzon, Madon, Moselle, Saône, and Meurthe; all unnavigable within the department. The minerals are valuable. The manufacturers are various. Epinal is the capital. Pop. 421,104.

Voss, JOHANN HEINRICH, German poet and translator, born in 1751. He received a scanty school education, acted for a time as private tutor in a family, and in 1772 went to Göttingen, where he studied the classical and modern languages, and was one of the founders of the Göttingen Dichterbund, or poets' union. In 1775 he retired to Wandsbeck, in order to edit the *Musen Almanach*, which he published till 1800. In 1778 he became rector of a school at Otterndorf, in Hanover, and in 1782 went as rector to Eutin. In 1805 he became professor at Heidelberg, where he remained till his death in 1826. Between 1785 and 1802 he published several volumes of original poems, the best of which is the idyllic *Luise*. As a translator Voss exhibited great skill in the handling of metres, and a wonderful command of language. Among his translations that of Homer's works is undoubtedly the greatest, being the classical German version of these great epics. A translation of Shakspeare, which he undertook with his sons, was published in nine volumes in 1829.

Vossius, GERHARD JOHANN, Dutch classical scholar, born in 1577, studied at Dordrecht and Leyden. In 1614 he undertook the direction of the theological college at Leyden, and subsequently became professor of rhetoric and chronology. Favouring the Remonstrants, he became obnoxious to the prevailing party in the church, and was deprived of his office. Archbishop Laud then conferred on him a prebendary stall at Canterbury, with permission to continue his residence in the Netherlands. In 1633 he was invited to Amsterdam, to occupy the chair of history, and continued there till his death in 1649. Several of his sons, especially Isaac, also distinguished themselves as scholars.

Voussoirs (vös'wärs), the wedge-shaped stones which form an arch. The under sides of the voussoirs form the intrados or soffit of the arch, and the upper sides the extrados. The middle voussoir is the keystone.

Vowel, a simple articulated sound, which is produced merely by voice proceeding from the larynx, modified by a greater or less

elevation or depression, expansion or contraction of the tongue, and contraction or expansion of the lips. The vowel sounds of the English alphabet are imperfectly represented by five letters, *a, e, i, o, u* (and sometimes *w* and *y*). Vowels are distinguished from consonants in that they result from an open *position* of the vocal organs, while consonants are the result of an opening or shutting *action* of the organs; thus the former can be pronounced by themselves, while consonants require to be sounded with the aid of a vowel.

Vulcan (L. *Vulcanus*), in Roman mythology, the god who presided over fire and the working of metals, and patronized handicraftsmen of every kind. By some writers he is said to have been born lame, but by others his lameness is attributed to his having been thrown from Olympus. He was completely identified with the Greek Hephaestus (which see).

Vulcanite, a kind of vulcanized caoutchouc, differing from ordinary vulcanized caoutchouc in containing a larger proportion of sulphur—from 30 to 60 per cent—and in being made at a higher temperature. It is of a brownish-black colour, is hard and tough, cuts easily, and takes a good polish, on which account it is largely used for making into combs, brooches, bracelets, and many other ornaments. As it is especially distinguished by the large quantity of electricity which it evolves when rubbed, it is much used in the construction of electric machines. See *Vulcanization*.

Vulcanization, a method of treating caoutchouc or india-rubber with sulphur to effect certain changes in its properties, and yield a soft (*vulcanized india-rubber*) or a hard (*vulcanite*) product. Other ingredients, as litharge, white-lead, whiting, &c., are added to the sulphur to give colour, softness, &c. The substance thus formed possesses the following properties: it remains elastic at all temperatures; it cannot be dissolved by the ordinary solvents, neither is it affected by heat within a considerable range of tem-

perature; finally, it acquires extraordinary powers of resisting compression, with a great increase of strength and elasticity. See *Vulcanite* and *India-rubber*.

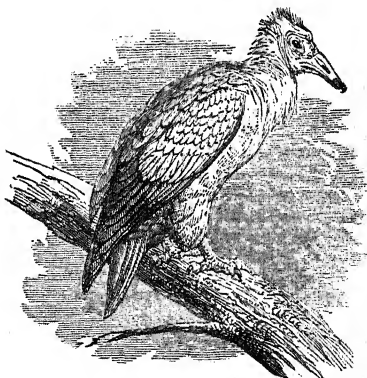
Vulgar Fractions. See *Fractions*.

Vulgate, the Latin translation of the Bible, which has, in the R. Catholic Church, official authority, and which the Council of Trent, in their fourth session, in May 27, 1546, declared 'shall be held as authentic in all public lectures, disputations, sermons, and expositions; and that no one shall presume to reject it, under any pretence whatsoever.' In the early period of the church a Latin translation of the Scriptures existed, called *Itala*, the Old Testament made after the Septuagint. This translation was far from accurate, and about 383 St. Jerome produced a revised version of the New Testament, while between 385-405 A.D. he made a new translation of the Old Testament from the Hebrew. These translations were combined to form the *Vulgate* (*versio vulgata*, common or usual version). The text of the Vulgate now in use is that published by Clement VIII. in 1592 (as improved in 1593 and again in 1598).

Vulture, the common name for the raptorial birds belonging to the family *Vulturidae*, characterized by having the head and part of the neck destitute of feathers, and a rather elongated beak, of which the upper mandible is curved at the end. The strength



Vulcan, from an antique.



Egyptian Vulture (*Neophron percnopterus*).

of their talons does not correspond with their size, and they make more use of their beak than of their claws. In general they are of a cowardly nature, living chiefly on

dead carcasses and offal. Unlike other birds of prey the female is smaller than the male. Their geographical distribution is confined chiefly to warm countries, where they act as scavengers to purify the earth from the putrid carcasses with which it would otherwise be encumbered. The griffon vulture (*Vultur fulvus*) inhabits the mountainous parts of the south of Europe, as does also

the cinereous or brown vulture (*V. cinereus*). The former measures nearly 4 feet from tip of beak to end of tail. The bearded vulture, or lämmergeier (*Gypaëtus barbatus*), inhabits the Alps, Asia, and Africa. The Egyptian vulture (*Neophron percnopterus*) visits S. Europe. See *Egyptian Vulture*, *King Vulture*, *Lämmergeier*, *Turkey-buzzard*, *Condor*.

W.

W, the twenty-third letter of the English alphabet, representing a consonantal sound formed by opening the mouth with a contraction of the lips, such as is performed in the rapid passage from the vowel sound *u* (*oo*) to that of *i* (*ee*). The character is formed, as its name indicates, by doubling the *u* or *v*. At the end of words or syllables it is either silent, as in *low*, or it modifies the preceding vowel, as in *new*, *how*, having then the power of a vowel.

Waal, a branch of the Rhine. See *Rhine*.

Wabash (wa'bash) a river of the United States, which rises in the N.W. of Ohio, winds across Indiana, forms the boundary between Indiana and Illinois, and falls into the Ohio after a course of 550 miles. It is navigable for steamboats to La Fayette, and connects Lake Erie with the Ohio by the Wabash and Erie Canal.

Wace, an Anglo-Norman poet, whose Christian name is generally believed to have been Richard or Robert, a native of Jersey, born about 1115, patronized by Henry II. of England, who made him a canon of Bayeux; died about 1180 or 1184. Two important works by him remain, the *Brut d'Angleterre* (see *Layamon*), and the *Roman de Rou*, a history of Rollo and the dukes of Normandy, including the conquest of England.

Wace, Rev. HENRY, D.D., English theologian, born in 1836. He graduated at Oxford in 1860, and was ordained the following year. After holding various metropolitan curacies he became in 1875 professor of Ecclesiastical History in King's College, London, and in 1884-97 was principal of that institution. He was rector of St. Michael's, Cornhill, in 1896-1903, and has been dean of Canterbury since 1903. Jointly with Dr. (Sir) Wm. Smith he was editor of the *Dictionary of Christian Biography, Literature, Sects, and Doctrines*; and has published lectures and other works.

Waco, a rising town of the United States, McLennan county, Texas. It is situated on the Brazos River; and as the centre of a large and fertile ranching and wheat growing district, it commands a large and increasing trade in cattle, wheat, and other agricultural products. Pop. 20,686.

Wada'i, or **WADAY**, a negro state and French protectorate in Central Soudan, between Kanem and Bagirmi in the west and Darfur in the east, with a population estimated at about 2,000,000, and an area of 170,000 sq. miles. It consists principally of a plateau, and comprises much desert, but is very fertile in some parts, producing abundantly maize, millet, cotton, &c. The inhabitants are semi-civilized. The troops of the Mahdi inflicted a crushing defeat on the Sultan of Wada'i's forces in 1888. Wada'i was recognized by Britain and Germany as under French influence, and in 1903 the people accepted the protectorate of France. The prevailing religion is Mohammedan. Capital, Abeshir.

Wadelai, a government post in the Nile Province of the Uganda Protectorate, on the Nile, 40 miles below lake Albert Nyanza. It was the chief station of Emin Pasha (Dr. Edward Schnitzer), governor of the province, who, after the Mahdist rising, was cut off from civilization, and who was relieved by H. M. Stanley. See *Stanley*, *H. M.*

Wadham College, Oxford, an institution endowed with estates purchased by Nicholas Wadham, of Meryfield, Somersetshire, and opened in 1613.

Wading Birds. See *Grallatores*.

Wadi Raian. See *Raian Moeris*.

Wafer, a thin circular cake of unleavened bread, generally stamped with the Christian monogram, the cross, or other sacred symbol, used in the Roman Church in the administration of the Eucharist.—Also a small

disc of dried paste usually made of flour and water, gum, and colouring matter, used for sealing letters, &c.

Wager, a bet or something staked on the event of a contest or some unsettled question. The party whose opinion proves to be correct receives what has been staked by both. By statutes of England, Scotland, and the United States, all contracts or agreements, whether by parole or in writing, depending on wagers, are null and void, and money due thereon cannot be recovered in any court of law. A wager is therefore merely a debt of honour.

Wages, generally speaking, the payment given for personal services; but the term is now usually restricted to the money paid at short intervals for mechanical or muscular labour. In England wages cannot legally be attached; but in Scotland wages in excess of 20s. per week are liable to arrestment (which see).

Wagner (väh'nér), **WILHELM RICHARD**, one of the most celebrated of modern composers, born at Leipzig 1813, died at Venice 1883. He received his education at Leipzig and Dresden. From 1834 he filled various musical engagements at Magdeburg, Riga, and Königsberg. In 1839-41 he went to Paris and London, and composed his operas *Rienzi* and the *Flying Dutchman*. The brilliant success of these operas secured him the conductorship at the Royal Opera of Dresden in 1843. He joined the insurrectionary movement of 1848-49, and was compelled to exile himself. Until his return to Germany in 1864 he spent most of his time in Switzerland, Italy, Paris, and London. His *Tannhäuser* and *Lohengrin* appeared in 1845 and 1850 respectively. The late King of Bavaria, Louis II., became an enthusiastic and liberal patron of Wagner, and the theatre at Baireuth, especially built for Wagner, was chiefly supported from the king's purse. Here his famous tetralogy *Der Ring des Nibelungen*, consisting of *Das Rheingold*, *Die Walküre*, *Siegfried*, and *Götterdämmerung*, was first performed in 1876 before an unusually brilliant and appreciative audience. About a year before his death he produced his last creation, *Parsifal*. In 1870 he had married, as second wife, Cosima von Bülow, a daughter of the Abbé Liszt. Wagner laboured to reform dramatic music according to the ideas of Gluck and Weber, and gave his creations a national character by selecting his subjects from old German heroic legends. His

theory (not in itself specially original) was that in a perfect musical drama the three arts, poetry, music, and dramatic representation should be welded together into one



Wilhelm Richard Wagner.

well-balanced whole. This theory he demonstrated with consummate ability and unsurpassed magnificence. His particular views on music are embodied in a well-known work entitled *Oper und Drama*.

Wagram, a village of Lower Austria, on the left bank of the *Rosbach*, 12 miles N.E. of Vienna, famous for the great battle in 1809 between the French under Napoleon and the Austrians under the Archduke Charles, each about 150,000 strong. The battle was well contested, but the result gave Napoleon a decisive victory, which was followed up by an armistice and the treaty of Vienna or *Schönbrunn* (Oct. 14th).

Wagtail, a name of birds included in the family of the warblers, and so termed from their habit of jerking their long tails when running or perching. They inhabit meadows and pastures, frequent water-pools and streams, are agile runners, and have a rapid flight. The food consists of insects. Their nests, built on the ground, contain from four to six eggs. These birds belong to both Old and New Worlds, and migrate southwards in winter; but the pied wagtail (*Motacilla Yarellii*) is a permanent resident in Britain. It is almost wholly black on the upper parts; the under parts are grayish white. Other representative varieties, distributed principally over the European continent and the East, are the white wagtail (*M. alba*); the gray wagtail (*M. campestris* or *Boarula*); and the yellow or Ray's wagtail (*M. sulphurea* or *Budytes Rayi*).

Wah. See *Panda*.

Waha'bees, **WAHA'BIS**, or **WAHA'BITES**, a Mohammedan sect, founded in Arabia about 1760 by Abd-el-Waháb, an oriental scholar of high attainments. He deemed it his mission to restore Islamism to strict harmony with the teachings of the Koran and the Sunna. Thousands flocked to the Wahabee standard, and enabled the reformer to secure the whole of his native province Nejd, and to carry his victorious arms into Yemen. Under his successors the greater part of Arabia fell under the Wahabee power. Mecca and Hejaz were captured in 1803, and the loss of the sacred city roused the Turks to action. Several expeditions were sent from Egypt, and in 1818 Ibrahim Pasha was at last successful in dispersing the Wahabee forces, in capturing their capital, Derayah, and their leaders, who were executed at Constantinople. They, however, gradually regained their influence, especially in their native homes of Nejd, where they form at present an independent state of Arabia. The latest statistics of Islamism estimate their number at four millions.

Waika'to, one of the principal rivers of New Zealand, in the North Island; length, about 200 miles. It traverses a district of great fertility.

Wainscot, the name given to panelled boards (usually oak or chestnut) employed to line the internal walls of an apartment. Wainscoting of oak was commonly used for interior linings in Elizabethan and Stuart times.

Waits, the name given at one time to the king's minstrels, whose duty it was to guard the streets at night and proclaim the hour; to the musicians of a town; and to private bands when employed as serenaders. The term is now applied to those who sing or play carols on Christmas and New-year's Eve with a view to donations.

Waitzen (vit'sen), or **Vács** (váts), a market-town and bishopric of Hungary, on the left bank of the Danube, 20 miles N. of Budapest. It has a splendid cathedral, and several important monastic and scholastic establishments. Pop. 17,000.

Wakatip'u, a picturesque lake in the South Island of New Zealand; area, 114 sq. miles. Queenstown and Glenorchy, on the borders of the lake, are favourite tourist resorts, on account of the magnificent mountain scenery in the vicinity.

Wake, a term corresponding originally to

vigil, and applied to a festival held on the anniversary of the day on which the parish church was consecrated and dedicated to a saint. A *lyke* or *lich wake* (Anglo-Saxon, *lic*, a corpse) is the watching of a dead body by night by the relatives and friends of the deceased. The practice, once general, is now confined to the lower Irish classes, and frequently accompanied by scenes much out of keeping with the sad occasion.

Wakefield, a mun. and parl. borough and episcopal city of England, W. Riding, of Yorkshire, on the Calder, 9 miles south of Leeds. It is well built, with wide and regular streets and several fine public buildings, especially the cathedral and the town-hall. The industrial establishments include woollen mills, and the trade is very extensive. The bishopric was created in 1888, mostly from that of Ripon. The borough returns one member to parliament. Wakefield is an ancient place, and has figured much in history. Pop. 41,544.

Wake-robin. See *Arum*.

Walachia. See *Roumania*.

Walcheren (vál'ke-rén), an island of Holland, province of Zeeland, at the mouth of the Scheldt. It is level, below high-water mark, very fertile, populous, and prosperous. It contains the thriving towns of Flushing, Middelburg (capital), and Veere. On July 30, 1809, the British expedition under Lord Chatham (elder brother of Pitt) landed near Veere, and took it, Middelburg, and Flushing, but had to retire the December following, after losing 7000 men by marsh fever. Pop. 48,000.

Waldeck and Pyrmont, a small principality of W. Germany, under Prussian administration, consisting of the two separate territories of Waldeck and Pyrmont; total area, 466 square miles; pop. 58,000. It is chiefly agricultural; the annual revenue averages £50,000. The residence of the prince is Arolsen, in Waldeck, which has 2750 inhabitants. The house is one of the most ancient in Germany. The reigning prince, Friedrich, succeeded his father in 1893. One of his sisters was married to the late King of Holland, another to the late Duke of Albany.

Walden'ses, a Christian sect which owes its origin to Peter Waldus (Waldo), a rich citizen of Lyons. About 1170 Waldo by his preaching collected numerous followers, who were often confounded with the Albigenses and others, whose fate they shared. Their chief strongholds were, and still are,

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in the mountain tract of the Cottian Alps, south-west of Turin, where, since 1848, they (about 10,000) enjoy the same religious rights, and now also the same political rights, as the Roman Catholics of Italy. The design of the founder was to reform the clergy, and to preach the word of God freely to every one in his native language; but his followers went far beyond the original plan. They made the Bible alone the rule of their faith, renounced entirely the doctrines, usages, and traditions of the Roman Church, and formed a separate religious society. They were, therefore, excommunicated as heretics, and for centuries suffered merciless persecution. Separate congregations found their way to various parts of Europe, and some of these became attached or amalgamated with other reformed sects. The spiritual teachers of the modern Waldenses are supplied from the academies of the Calvinistic churches. The Waldensian rites are limited to baptism and the Lord's supper, respecting which they adopt the notions of Calvin. Each congregation is superintended by a consistory composed of elders and deacons, under the presidency of the pastor, which maintains the strictest moral discipline, and adjusts small differences. From the time of their origin the Waldenses have been distinguished by their pure morals and their industry.

Wales, a principality in the south-west of the Island of Great Britain, which since Edward I. gives the title of Prince of Wales to the heir-apparent of the British crown; area, 7363 square miles; pop. 1,720,609. It is divided into twelve counties, for the names and areas of which see the article *England*. As a whole it is very mountainous, particularly in the north, where Snowdon, the culminating point of South Britain, rises to the height of 3571 feet; and it is intersected by beautiful valleys, traversed by numerous streams, including among others the large river Severn. It is rich in minerals, particularly coal, iron, copper, and even gold, and to these Wales owes its chief wealth. The coal trade is most extensive, and Cardiff (which see) is the largest coal port in the world. Iron, steel, and copper works are also on a large scale. Besides the mineral industries, there are considerable woolen manufactures, especially of flannel, coarse cloth, and hosiery. (See *England and Britain*.) The inhabitants are almost purely Celtic in race, being the descendants of the early Britons, who were able to maintain them-

selves here when the rest of the country was overrun by the Germanic invaders. Most of the upper class belong to the Established Church, but probably a majority of the inhabitants are Nonconformists or Dissenters, the most numerous bodies being the Congregationalists, the Calvinistic Methodists, and the Baptists.

Previous to the Roman occupation Wales appears to have been chiefly inhabited by three British tribes, called the Silures, Dimetæ, and Ordovices. During the later period of the Roman occupation the subject part of the island was divided into four provinces, of which one, including the country from the Dee to the Severn, was called *Britannia Secunda*. It was after the invasion of the Saxons that the country acquired a distinctive national character as the refuge of the vanquished Britons who were gradually driven to the west. From this period till the final conquest of the country by Edward I. there is little but a succession of petty wars between the rival chiefs or kings into which both countries during a great part of the Saxon period were divided, or the more systematic efforts of the larger monarchy to absorb the smaller. Among the greatest of the Welsh heroes of the early period was Cadwallon. After being defeated by Edwin of Deira, or Northumbria, and compelled to flee to Ireland, he returned and defeated the Saxons in numerous battles, but was at last defeated and slain by Oswald of Northumbria in 635. The last of the Welsh princes, Llewellyn, who revolted against Edward I., was defeated and slain by the Earl of Mortimer in 1284, and since that time the principality has been incorporated with England.

The native name of the Welsh language is *Cymraeg*, the speech of the *Cymri* (which see). The names *Wales* and *Welsh* are of Anglo-Saxon origin, from *wealas*, strangers, foreigners (plural of *wealh*). The Welsh language is, with the other Celtic languages, included in the Indo-European group. The alphabet contains thirteen simple and seven double consonants, and seven vowels, with numerous diphthongs and triphthongs. It is still spoken exclusively by more than a quarter of a million of the inhabitants of Wales. The necessities of commerce are, however, gradually doing for the Welsh language what they have done for the Irish and Gaelic, and English is becoming more and more the language of everyday life in Wales. The earliest remains of Welsh

literature are supposed to belong to the 9th century. There are a number of poetic pieces attributed to Taliessin, Aneurin, Merlin, and Llywarch Hen, bards supposed to have lived in the 5th century; but great and reasonable doubts have been thrown on the authenticity of these early productions, which, in their present form at least, are not believed to be earlier than the 11th century. Subsequent to this time there were numerous poems written, many in praise of warriors, others dealing with love, or descriptive of nature. Dafydd ap Gwilym (1293-1356) has been called the Ovid of Wales. Huw Morris (1622-1709) and Goronwy Owen (1722-80) are likewise distinguished as poets. The last produced the *Cywydd y Farn* (Day of Judgment), regarded as the finest poem in the language. There are a number of prose tales or romances, the chief of which are contained in a collection known as the *Mabinogion*. The first Welsh book ever printed appeared in 1546. Modern works in Welsh are mostly confined to theology, history, and biography.

Wales, PRINCE OF, the title conferred on the male heir-apparent of the English sovereign since the time of Edward I.

Wales, UNIVERSITY OF, a university chartered in 1893, and formed by a union of the University College of Wales at Aberystwith, of North Wales, at Bangor, and of South Wales and Monmouthshire, at Cardiff. Degrees are conferred in arts, science, law, theology, and music, and women are admitted.

Walfisch Bay, a British settlement and harbour in South-west Africa, now inclosed by German territory; area, about 430 sq. miles; pop. 1015. It was acquired in 1878, annexed to Cape Colony in 1884.

Walhalla, a Doric temple, on the Danube, near Ratisbon (Bavaria), built in 1830-42 as a national pantheon, commemorating celebrated Germans by statues, busts, &c. See *Valhalla*.

Walker, FREDERICK, English painter, born at London 1840, died 1875. At an early age he began drawing, and after spending about eighteen months in an architect's office became a student at the Royal Academy (1858), and commenced designing for wood engravers. The illustrations he supplied from 1860-64 to the *Cornhill Magazine* and *Once a Week* are full of life, and rank high as specimens of this kind of draughtsmanship. Some of these drawings he reproduced in water-colour, in which

medium he produced a number of exquisite pictures. In 1863 he exhibited his first oil-painting, *The Lost Path*, at the Royal Academy, and was made an associate R.A. in 1871. His best works in oil are *The Bathers*, and *By the Plough*. Originality, poetic feeling, graceful drawing, and remarkable purity and range of colour characterize his paintings.

Walker, REV. GEORGE, was born of English parents, in county Tyrone (Ireland), in the early part of the 17th century, and was killed at the battle of the Boyne in 1690. He studied theology at Glasgow University, and after taking orders obtained the living of the parish of Donoughmore. He was rescued from obscurity by the arrival of James II. in Ulster (1689), which caused Walker to seek refuge in Londonderry; and in the memorable siege of that city he took the most prominent part both in word and deed. (See *Londonderry*.) After the siege Walker went to London, was presented with the bishopric of Derry and £5000 and parliament voted him its thanks. Instead of taking quiet possession of his bishopric, he accompanied William III. in his Irish campaign, and fell a victim to his courage.

Walking-Leaves and Walking-Sticks. See *Leaf-insects*, *Phasmidae*, *Mimicry*.

Walkyrias. See *Valkyrias*.

Wallaby, a name common to several rather small-sized kangaroos of the genus *Halmaturus*.

Wallace, ALFRED RUSSEL, LL.D., naturalist, born at Usk, Monmouthshire, in 1823, and educated at Hertford Grammar-school. He has spent many years in travelling, especially in South America and the Asiatic Islands, and the valuable material collected in these scientific explorations he has embodied in *Travels on the Amazon and Rio Negro*, *The Malay Archipelago*, *Tropical Nature*, *The Geographical Distribution of Animals*, &c. His observation of animal life early led him on to the track of natural selection, and before Darwin gave his famous work to the world he had published his *Speculations on the Origin of Species*. His share in establishing the theory has been acknowledged by Darwin. But while Darwin, in his later editions of the *Origin of Species*, somewhat modified his original conclusions, Wallace, in his mature work, *Darwinism*, an *Exposition of the Theory of Natural Selection*, with some of its Applications (1889), strongly insists upon the complete controlling power of these primary laws and con-

ditions. Wallace, however, differs from Darwin on the subject of the intellectual, moral, and spiritual nature of man. He contends that the higher faculties have been developed not under the law of natural selection, but under a higher law, which has come in imperceptibly; and that the Darwinian theory, instead of opposing, 'lends a decided support to a belief in the spiritual nature of man.' He claims to be at once a true Darwinian and an anti-materialist. Of late years Wallace has also paid much attention to social questions, has written on the land question, and against compulsory vaccination. He is a member of various scientific bodies, and the Royal Society of London awarded him the royal medal in 1868, and the Geographical Society of Paris the gold medal in 1870.

Wallace, SIR WILLIAM, the hero of Scottish independence, is said to have been the younger son of Sir Malcolm Wallace of Elderslie and Auchinbothie, by Margaret, daughter of Sir Reynold Crawford, sheriff of Ayr. He was probably born about 1270. For the most detailed particulars we possess about this famous Scottish character we are almost entirely dependent on Blind Harry (see *Harry the Minstrel*); but the narratives cannot bear the scrutiny of the critical historian. Contemporary Scottish records do not exist, while the English chroniclers of the period were but imperfectly informed and prejudiced. Wallace is described as a man of herculean proportions and strength, and it is certain that he possessed in a high degree the qualifications of a commander. He is represented as having been for some years engaged in a partisan war against the English before what is represented by Blind Harry as the turning-point in his career took place, the slaughter of Haselrig in revenge for the murder of his wife, and in pursuance of his vow of eternal vengeance against the invaders of his country. Henceforth he continued in open resistance to the English, and having collected a considerable force was besieging the castle of Dundee when he heard that Surrey and Cressingham were advancing upon Stirling with a large army. He met them in the vicinity of that town, and, thanks to his ingenious military tactics, gained a complete victory (1297). After this Wallace appears with the title of Guardian of the Kingdom, which was temporarily cleared of the English, and is found conducting a series of organized raids into England. In 1298 Edward I.

entered Scotland with an army estimated at nearly 90,000 men. Wallace retired before him, wasting the country, but was at length overtaken at Falkirk, compelled to fight, and after a gallant resistance his army was routed. He succeeded in escaping, and little is known of his movements henceforth. He was excluded from the peace granted by Edward to the Scottish council of regency in 1304, and every effort was made to secure his apprehension. It was effected through Alexander de Monteith, governor of Dumbarton Castle. Wallace was conveyed to London, and after a mock trial found guilty of treason and rebellion, and executed on the 23d August, 1305. A memorial to Wallace has been placed on the summit of Abbey Craig, near Stirling, in the form of a Scotch baronial tower, surmounted by an architectural crown, and having a height of 220 feet. It serves the purpose of a Scottish Walhalla, and busts of eminent Scotchmen are from time to time added.

Wallace, WILLIAM VINCENT, musical composer, was born of Scotch parents, at Waterford 1813, died in France 1865. His father, the bandmaster of the 29th Foot, taught him to play on the usual military instruments, and procured him teachers of the violin, pianoforte, and guitar. He spent some years in Australia, and made an extensive concert tour in the Australian colonies, in India, and in America. In 1845 he went to London, and devoted himself to composition. His first opera, *Maritana*, was produced at Drury Lane, 1845, and secured him at once a reputation. *Lurline* and the *Amber Witch* are his other chief operatic compositions. For the pianoforte he wrote numerous airs of great sweetness, which are very popular.

Wallachia. See *Roumania*.

Wallaroo, the native Australian name given to two species of kangaroos, the *Macropus antipodinus*, the red wallaroo, and *M. robustus*, the black wallaroo, found in New South Wales.

Wallaroo, a seaport town in South Australia, on the Spencer Gulf, 91 miles north of Adelaide. The Wallaroo and other copper mines are in the neighbourhood, and the largest smelting works in the colony are carried on at Wallaroo Bay. Pop. 3500.

Wallenstein (va'l'en-stin), ALBRECHT WENZEL EUSEBIUS, VON, Duke of Friedland, a famous leader in the Thirty Years' war, was born on the paternal estate of Hermanic in Bohemia 1583, assassinated at Eger 1634.

Both his father and mother belonged to the Bohemian evangelical church, but shortly after their early death Wallenstein went over to the Roman Catholic faith. He finished his studies at the Universities of Bologna and Padua, and travelled in Italy, Germany, France, Spain, England, and the Netherlands. He took military service in Hungary, and returned to Bohemia at the peace of 1606 with the rank of captain. When the Thirty Years' war broke out in Bohemia (1618) he joined the imperial forces against his native country. His estates, valued at 30 million florins, he was allowed to form into the territory of Friedland, and in 1624 he was created Duke of Friedland. He raised a large army to assist the emperor against the Lower Saxon League; he defeated Count Mansfeld at Dessau (April 1626), and compelled Bethlen Gabor to conclude a truce; he conquered Silesia, and bought from the emperor, partly with military services, partly with plunder, the duchy of Sagan, and other extensive estates. In September 1630, owing to the jealousy of the nobles and the license of his followers, he was deprived of his command, and retired to his duchy of Friedland until the emperor was compelled to seek his aid against Gustavus Adolphus. Wallenstein now obtained almost absolute power, and did not fail to abuse it. His behaviour henceforth leaves no doubt that the emperor's interests were second to his own, and that he would not have hesitated to join the emperor's enemies to secure his own independence and the crown of Bohemia. After some partial successes he encountered the King of Sweden at Lützen, 16th November, 1632, in which battle Wallenstein was defeated and Gustavus killed. Wallenstein had unsuccessfully treated on his own account with the Swedish king, and he now secretly reopened negotiations with France and the German princes, occasionally taking the field to display his military power. The court at Vienna was well aware of his crafty diplomacy, but the emperor was not strong enough to remove him, and he had recourse to assassination. This was accomplished for him at Eger, where Wallenstein had retreated for safety, by Colonel Gordon, commandant of the fortress, and his fellow officers Butler, Leslie, and Devereux. Wallenstein is the subject, and gives the title to one of Schiller's best dramatic poems.

Waller, EDMUND, English poet, born at

Coleshill, Hertfordshire, 1606; died 1687. Early left an orphan with a considerable estate, he was educated at Eton and King's College, Cambridge. He entered parliament young, and was long prominent in politics, sometimes inclining to one side, sometimes to the other. It is said he wrote poetry at eighteen, but his first collection of poems did not appear until 1645. As an elegant amatory and panegyric poet, a brilliant talker and wit, he was a great favourite at court, in parliament, and in society. But his political conduct is not honourable. At heart he probably remained true to royalty, but he sang the praises of the Lord Protector as well as those of the Charleses. He was sent as commissioner from parliament to the king after Edgehill. Shortly after he plotted in favour of the king, and when detected turned informer. His brother-in-law Tomkins, and the latter's friend Chaloner, suffered death, while Waller by his judicious bribery got off with banishment and a fine of £10,000. After seven years of exile in France (1644–51) his sentence was revoked by parliament, and he took his usual place in society and parliament, and was afterwards welcome at the courts of Charles II. and James II.

Wallflower, the common name of the species of plants belonging to the genus *Cheiranthus*, natural order Cruciferae. They are biennial or perennial herbs or undershrubs. Many of them exhale a delicious odour, and are great favourites in gardens. The best known is the *C. Cheiri*, or common wallflower, which, in its wild state, grows on old walls and stony places. In the cultivated plant the flowers are of more varied and brilliant colours, and attain a much larger size than in the wild plant, the flowers of which are always yellow. A number of distinct varieties have been recorded, and double and semi-double varieties are common in gardens.

Wallis, the German name of the Valais. See *Valais*.

Wallis, JOHN, English mathematician, born in 1616, died in 1703. Educated for the church at Emanuel College, Cambridge, he took orders in 1640, and in 1663 obtained a living in London. He was one of the secretaries to the assembly of divines at Westminster; became Savilian professor of geometry at Oxford in 1649, and D.D. in 1654. Charles II., for services rendered to the royal cause, made him one of the royal chaplains, and in 1661 he was one of the divines appointed to revise the Book of

Common Prayer. He was one of the earliest and most useful members of the Royal Society, founded in 1663. He was the author of many mathematical, theological, and controversial works and papers, the most important of which are his Arithmetic of the Infinities, and his Mechanics.

Walloon, or WALLONS', lineal descendants of the old Gallic Belgæ, who occupy the Belgian provinces of Hainault, Liège, Namur, and part of Southern Brabant and Western Luxembourg, with adjacent parts of France. They differ in physique from their Flemish compatriots, and a large proportion of them have black hair and eyes. They are not so numerous as the Flemings in Belgium. Their language, also called Walloon, is a French patois retaining numerous Gallic words, but it somewhat varies in the different provinces.

Wallsend, a town of Northumberland, on the Tyne, 4 miles N.E. of Newcastle. It is named from being situated at the eastern extremity of the Roman Wall, and was formerly famous for its coal. There are blast-furnaces, engineering works, chemical works, &c. Pop. 20,922.

Walnut, the common name of trees and their fruit of the genus *Juglans*, nat. order Juglandaceæ. The best known species, the common walnut-tree (*J. regia*), is a native of several Eastern countries. It is a large handsome tree with strong spreading branches. The timber of the walnut is of great value, is very durable, takes a fine polish, and is a beautiful furniture wood. It is also employed for turning and fancy articles, and especially for gun-stocks, being light and at the same time hard and fine grained. The ripe fruit is one of the best of nuts, and forms a favourite item of dessert. They yield by expression a bland fixed oil, which, under the names of *walnut-oil* and *nut-oil*, is much used by painters, and in the countries in which it is produced is a common article of diet. In copper-plate printing it is employed to produce a fine impression, either in black or colours. By boiling the husks when beginning to decay, and the bark of the roots, a substantial dark-brown colour is obtained, which is used by dyers for woollens, and also by cabinet-makers to stain other species of wood in imitation of walnut. The fruit, in a green state, before the shell hardens, is much used for pickling. The black walnut (*J. nigra*) is found in most parts of the United States of America, and in favourable situations the trunk often

attains the diameter of 6 and 7 feet. It yields a wood preferable to the European walnut, but the nuts are inferior. The



Walnut (*Juglans regia*).

butternut (*J. cathartica*) is another noteworthy variety. See *Butternut*.

Walpole, HORACE, Earl of Orford, third son of Sir Robert Walpole, born 1717, died 1797. He was educated at Eton, and King's College, Cambridge, on leaving which he travelled two years on the Continent in company with Gray the poet. Returning in 1741 he entered the House of Commons, and he sat for various constituencies up to 1768. He always took a lively but superficial interest in politics, inclining sentimentally to extreme opinions. In 1747 he purchased Strawberry Hill, near London, where he erected a Gothic villa, laid out the grounds with minute ingenuity, and made it a principal business of his life to adorn and furnish it with objects of curiosity and antiquarian interest. His maintenance was provided for by some sinecure appointments, obtained through his father's influence. To his antiquarian taste he added authorship, first in verse and afterwards more extensively in prose, and in 1757 he established a private printing-press at Strawberry Hill, at which he printed not only his own works but those of others. In 1791 he succeeded his nephew in the peerage. He never took his seat in the House of Lords, and appears to have avoided using his title. The works of Horace Walpole are numerous; but his fame as a writer rests on his Letters and Memoirs. The former are held to be unsurpassed in the English language, and both are highly

interesting and valuable as a storehouse of the more evanescent traits of contemporary history. His romance, *The Castle of Otranto*, is also well known. Walpole's manners were affected; he was fastidiously aristocratic, sensitive to criticism, and eager for applause; but under his vanity and frivolity there existed a substratum of good sense and sound judgment. He never married.

Walpole, SIR ROBERT, Earl of Orford, a great Whig statesman, was a younger son of Sir Robert Walpole, M.P. for Castle



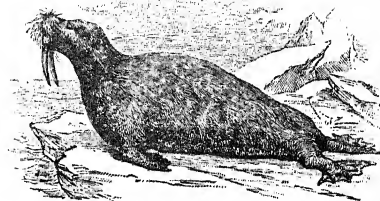
Sir Robert Walpole.

Rising, was born in 1676, and died in 1745. He was educated at Eton, and at King's College, Cambridge; succeeded to the paternal estate in 1700, and entered parliament as member for Castle Rising. In 1702 he was elected for King's Lynn, became an active member of the Whig party, and soon distinguished himself by his business capacity, and by his easy, plausible, and dispassionate debates. He was secretary of war and leader in the Commons in 1708, paymaster of the forces in 1714 and 1720, and first lord of the treasury and chancellor of the exchequer in 1715, and again in 1721. From the latter date until 1742 he held without interruption the highest office in the state. During his long administration the Hanoverian succession, to which he was zealously attached, became firmly established, a result to which his prudence and political sagacity largely contributed. He promoted by an enlightened policy the commercial prosperity of the nation, and relieved the weight of taxation by many improvements in the tariff. In 1724 he was made a Knight of the Bath, in 1726 a

Knight of the Garter, and on 9th Feb., 1742, two days before his resignation, he was created Earl of Orford. In an age famous for venality and lax morals he was the least corrupted, the soberest, and the hardest working of the leaders of both factions. An able monograph on Walpole has been published by John Morley.

Walpurga, WALBURGA, or WALPURGIS, a female saint, born in England early in the 8th century, died 779. She was for many years a nun in a Dorsetshire convent. As a niece of St. Boniface, and sister of St. Willibald, first bishop of Eichstädt, Bavaria (741-786), she was induced to proceed to Germany to found convents, and in 754 she became abbess of Heidenheim, a convent within her brother's bishopric. She died at the latter place, but was buried at Eichstädt, and her shrine was visited by many pilgrims and was the scene of many miracles. The eve of the 1st May, associated with some of the most popular witch superstitions of Germany, is called *Walpurgis-night*, but her feast falls properly on the 25th of February.

Walrus, a marine carnivorous mammal, the single species constituting a genus *Trichæus*, as well as the family Trichecidæ, and belonging, with its allies the seals, to the pinnigrade section of the order Carnivora. The walrus, which is also known as the morse, sea-horse, and sea-cow, has a general resemblance to the seals, but is especially remarkable from the upper canine teeth being enormously developed in the adults, constituting two large pointed tusks directed downwards and slightly outwards, and measuring usually 12 to 15 inches in length, sometimes even 2 feet and more. There are no external ears. The



Walrus (*Trichæus rosmædrus*).

animal exceeds the largest ox in size, attaining a length of 20 feet. It is monogamous, and seldom produces more than one young

at a birth; gregarious but shy, and very fierce when attacked. It inhabits the high northern latitudes, where it is hunted by whalers for its blubber, which yields excellent oil; for its skin, which is made into a durable leather; and for its tusks. Their favourite food consists of crustaceans.

Walsall, a parl., county, and municipal borough of England, in the county of Stafford, 8 miles N.N.W. of Birmingham. The present town is almost entirely modern. Extensive coal, iron, and limestone deposits in the immediate vicinity, and ample canal and railway communication with leading trade centres, have made an important manufacturing town of Walsall. Brass and iron foundries are numerous and on a large scale; and for saddlers' and carriage-builders' ironmongery, tools, locks, and keys, &c., Walsall has long been famous. It returns one member to parliament. Pop. (co. and parl. bor.), 86,430.

Walsham, NORTH. See *North Walsham*.

Walsingham, SIR FRANCIS, English statesman of the reign of Elizabeth, born of good family about 1530, died in 1590. After studying at King's College, Cambridge, he travelled on the Continent for some time, and acquired a good knowledge of foreign languages and politics. He was introduced by Cecil, Lord Burleigh, to public service, and employed in embassies to France, the Netherlands, and Scotland. He also sat in the House of Commons for various constituencies, and occupied important public offices. His sagacity and discretion caused him to be much employed, often against his own desire, in the intrigues of Elizabeth, especially against Mary Queen of Scots. The unravelling of the Babington plot was intrusted to Walsingham, and he was also one of the commissioners who tried Queen Mary.

Walter, JOHN, the name of three members of a family closely connected with the rise and progress of printing and journalism. See *Times*, *The*, and *Printing*.

Waltham, a town of the United States, Massachusetts, 9 miles west of Boston. The Charles River supplies abundant water-power to its factories of watches, watch-tools, and cottons. Pop. 23,481.

Waltham Abbey, WALTHAM HOLY CROSS, a town of England, in Essex, 12 miles N. by E. of London, on the Lea. Part of an old abbey church founded by King Harold in 1060 now belongs to the parish church. The abbey once possessed a miraculous cross. There are government gunpowder and cor-

dite factories. At Waltham Cross in Hertford, $1\frac{1}{2}$ miles from Waltham Abbey, is one of Edward I.'s crosses. Pop. 6547.

Walthamstow, a town and parl. div. of Essex, a suburb on the north-east of London. Pop. of town, 95,125.

Walther von der Vogelweide (f5'gl-vi-dè), one of the most eminent old German lyric poets of the class of *Minnesingers*, was born about 1170, died at Würzburg about 1230. His earliest patrons were Duke Leopold VI. of Austria and his son Frederick. Subsequently he visited, for shorter and longer periods, the courts of most German princes, who were in favour of an imperial as against a papal policy and who could appreciate his distinguished muse. The emperor Frederick II. provided him with a small estate near Würzburg, where he seems to have always retired when disgusted with travelling, the courts, and intrigues, and there he died. He was a politician and reformer as well as a poet, and his exquisite and manly verses breathe a liberalism far in advance of his times; while the subjects of his favourite love-songs are women true and noble.

Walton, IZAAK, the author of the famous *Complete Angler*, was born at Stafford 1593, died at Winchester 1683. For a number of years he carried on successfully in London the business of an ironmonger, but he retired at the age of fifty, and devoted his remaining forty years to a life of cultured ease and pleasure. In 1626 he married a relative of Archbishop Cranmer, and about 1646 a half-sister of Bishop Ken. Through these matrimonial alliances he became friendly and intimate with many of the distinguished ecclesiastics of his time, and wrote the biographical memoirs of some of them. His first edition of the *Complete Angler* appeared in 1653. It is to his exquisite delineations of rural scenery, his genuine love for the Creator and his works, the ease and unaffected humour of the dialogue, and the delightful simplicity and purity of his style, that the *Complete Angler* owes its charm.

Waltz, a dance of Bohemian origin, executed with a rapid wheeling motion, the gentleman having his arm round his partner's waist. The music is written in triple time in crochets or quavers, and consists of eight or sixteen bar phrases. Several of these phrases are now usually united to prevent monotony. The *valse à deux temps* is a form of waltz in which two steps are

made to each bar of three beats. *Classical waltzes* are compositions in waltz form not intended for dance tunes.

Wandering Jew. See *Jew, The Wandering*.

Wanderoo (*Macacus silenus*), a monkey inhabiting Ceylon and the East Indies. The length is about 3 feet to the tip of the tail, which is tufted, and much resembles that of the lion; the colour of the fur is deep-black; the callosities on the hinder quarters are bright pink; a well-developed mass of black hair covers the head, and a great grayish beard rolls down the face and round the chin.

Wandsworth, a London parliamentary and municipal borough. Pop. 232,030. Wandsworth proper is situated at the confluence of the Wandle with the Thames, immediately to the s.w. of Battersea, and is an important centre of industry.

Wantage, a market-town of England, Berkshire, in the fertile vale of the White Horse, birthplace of King Alfred, of whom there is a statue. Pop. 3766.

Wapentake, the name formerly given in some of the northern shires of England, and still given in Yorkshire, to a territorial division of the county, corresponding to the *hundreds* of the southern counties.

Wap'iti, a species of deer, the North American stag (*Cervus canadensis*), which more nearly resembles the European red-deer in colour, shape, and form than it does any other of the cervine race, though it is larger and of a stronger make, its antlers also being larger. It is found in Canada and the northern parts of the United States from the Atlantic to the Pacific. Its flesh is not much prized, being coarse and dry, but its hide is made into excellent leather.

Wapping, a district of East London, in Middlesex, on the north bank of the Thames, inhabited chiefly by persons employed in the shipping of the port of London. Here are the London Docks, St. Catherine's Docks, &c., and the stupendous warehouses belonging to the custom-house, &c. See *London*.

War, a contest between nations or states (*international war*), or between parties in the same state (*civil war*), carried on by force of arms, usually arising in the first case from disputes about territorial possessions and frontiers, unjust dealings with the subjects of one state by another, questions of race and sentiment, jealousy of military prestige, or mere lust of conquest, rarely nowadays from the whim of a despot; in

the second case, from the claims of rival contenders for supreme power in the state, or for the establishment of some important point connected with civil or religious liberty. In all cases the aim of each contending party is to overthrow or weaken the enemy by the defeat or dispersion of his army or navy, the occupation of important parts of his country, such as the capital or principal administrative and commercial centres, or the ruin of his commerce, thus cutting off his sources of recuperation in men, money, and material. International or public war is always understood to be authorized by the monarch or sovereign power of the nations; when it is carried into the territories of a hitherto friendly power it is called an *aggressive* or *offensive war*, and when carried on to resist such aggression it is called *defensive*. Previous to the outbreak of hostilities between states, the power taking the initiatory step issues a *declaration of war*, which now usually takes the form of an explanatory manifesto addressed to neutral governments. During the progress of the struggle certain *laws, usages, or rights of war* have come to be generally recognized; such laws permitting the destruction or capture of armed enemies, the destruction of property likely to be serviceable to them, the stoppage of all their channels of traffic, and the appropriation of everything in an enemy's country necessary for the support and subsistence of the invading army. On the other hand though an enemy may be starved into surrender, wounding, except in battle, mutilation, and all cruel and wanton devastation, are contrary to the usages of war, as are also bombarding an unprotected town, the use of poison in any way, and torture to extort information from an enemy; and generally the tendency in all laws and usages of war is becoming gradually more favourable to the cause of humanity at large. See also *International Law*.

War, PEASANTS'. See *Peasants' War*.

Warbeck, or OSBEC, PERKIN, the son of a Flemish Jew, was set up by Margaret of York, dowager-duchess of Burgundy, as a pretender to the crown of England against Henry VII. For this purpose she recognized him as her nephew, Richard Plantagenet, duke of York, the younger of the two princes who were murdered in the Tower by Richard III. He was patronized by France and Scotland, married a kinswoman of the Scottish king, James IV., made sev-

WARBLERS — WARMING AND VENTILATION.

eral fruitless invasions of England and Ireland, was taken prisoner after an attempt on Cornwall (Oct. 1497), and confined to the Tower, where, his plotting being continued, he was executed (Nov. 1499).

Warblers (*Sylviadæ*), the name applied to a family of denti-rostral insectorial birds, generally small, sprightly, very shy, and remarkable for the clearness, sweetness, and flexibility of their song. Insects form their food, and most of them are migratory. The typical warblers belong to the genus *Sylvia* (which see).

Warburton, WILLIAM, D.D., English prelate, was born at Newark-upon-Trent in 1698, died at Gloucester in 1779. He was brought up to the law, but not finding this profession to his taste he relinquished it, and in 1728 took deacon's orders in the church. In 1727 he began to distinguish himself as a writer by his inquiry into the Causes of Prodigies and Miracles. This led to his being presented to the rectory of Brand Broughton, in Lincolnshire, where he remained many years, composing here most of those works which contributed to the establishment of his fame. In 1736 appeared his first important work, the *Alliance between Church and State*, &c., which brought him into favourable notice at court; but his great work is the *Divine Legation of Moses*. It was assailed in many quarters, and Warburton carried on the controversy with ability and intemperate vigour. A defence of Pope's *Essay on Man* secured him the friendship of the poet, and he became a considerable beneficiary under the latter's will. By the death of Ralph Allen (which see), whose niece he had married in 1745, Warburton succeeded to the splendid seat of Prior Park, in Gloucestershire. He was appointed, in 1746, preacher to the society of Lincoln's Inn, and from that time his advance in church preferment was rapid, until he became bishop of Gloucester in 1759.

Ward, ARTEMUS. See *Browne, C. F.*

Ward, EDWARD MATHEW, R.A., English painter, born at London 1816, died at Windsor 1879. In 1835 he joined the classes at the Royal Academy. The following year he went to Italy, where he studied fresco painting under Cornelius. He took part in the competition, opened 1843, for decorating the Houses of Parliament, his designs being illustrative of events in the history of Boadicea. Eight of his designs were finally accepted, and executed by him in the cor-

ridor of the House of Commons in 1853. He was elected A.R.A. in 1847, and R.A. in 1855. For his subjects he generally chose interesting historical episodes and popular characters; and many of his paintings have been reproduced by the engraver.

Ward, MRS. MARY AUGUSTA, novelist, granddaughter of Dr. Arnold of Rugby, born 1851, married 1872 Thomas Humphry Ward. Her chief novels include: *Robert Elsmere* (1888), a novel of religious doubts and perplexities; *The History of David Grieve*; *Marcella*; *Sir George Tressady*; *Helbeck of Bannisdale*; *Lady Rose's Daughter*; *The Marriage of William Ashe*. She has also written plays, and contributed to periodicals, &c.

Ware, a market-town of England, in Hertfordshire, 21 miles north of London, on the banks of the Lea. The chief industries are brick-making and malting for the London breweries. Pop. 5573.

Wareham, an ancient town of England (previously to 1885 a parl. borough), in Dorsetshire, near the mouth of the Frome, still partly surrounded by an earthen wall dating from British times. Pop. 2003.

Warm-blooded Animals. See *Animal*.

Warming and Ventilation. The condition of the atmosphere of our houses and apartments is of such importance to health and vigour of mind that warming and ventilation, two closely allied subjects, are receiving more and more attention as sanitary science advances. Their neglect has been the cause of, and is still responsible for, an incalculable amount of human disease and suffering. The body, to remain in health, requires a certain degree of heat; so that, if the surrounding atmosphere is too low in temperature, artificial means must be employed to raise it. The temperature which is found the most agreeable for the air of apartments, in which the occupants are not engaged in bodily exercise, is from 63° to 65° F. The charcoal brazier is a very ancient method of warming an apartment. The Greeks and other nations commonly used it, and they sought to correct the deleterious nature of the fumes by burning costly odorous gums, spices, and woods; but the carbonic acid given off by the combustion of charcoal is very injurious to health. The ordinary open coal-fire is, if not the most economical, at least the most agreeable means of heating apartments, but the waste of heat is very considerable. This waste early led to the introduction of closed stoves,

first in earthenware and then in metal. These closed stoves, of which there are innumerable varieties in form and construction, are particularly favoured in America and the European continent, and certainly effect a great saving in fuel; but they do not form natural ventilators, like the open fireplaces, and are liable to overheat the rooms and to render the air in them too dry. For public buildings, warehouses, conservatories, &c., the most extensively employed system of heating is that of large hot-water pipes. The hot-water apparatus, in its simple and practical form, was introduced by Atkinson in 1822. The circulation of water is brought about on the principle of the expansion of water by heat, and its greater lightness in consequence. Whatever be the height of the water above, the water when heated in the lower part of a boiler will rise to the surface, making room for other and colder particles to be heated in their turn; hence if a pipe full of water rise from the top of a boiler to any required height, and then return by gentle bends to the boiler at the lower part, heated water will rise and occupy the upright pipe, and the colder water will descend into the boiler to take its place. Thus a continuous circulation may be maintained through pipes in a building, the heated water rising up, passing on, and returning cooled to the lower part of the boiler, causing a satisfactory temperature to be everywhere felt. The greater the elevation to which the heated water ascends, and the higher the initial temperature of the water, the greater is the motive power for circulation. There are also several systems of heating by passing steam or hot air through pipes.

Ventilation is the method of maintaining the purity of the air in closed or confined spaces by expelling foul air and admitting fresh without draughts. Of the products which vitiate the air carbonic acid (more properly called carbon dioxide) is the chief. Air which has been utilized by living beings is always charged with this gas, and also with a varying amount of watery vapour, the quantity of which is increased as the air is warmed; and smaller quantities of ammonia and organic matter, with various species of bacteria, render the atmosphere not only unfit but actually dangerous for respiration. Authorities on hygiene differ somewhat as to the amount of air necessary for healthy living rooms, but it is generally admitted that not less than 1500 cubic feet of fresh air per

healthy person should be supplied every hour, and from 3000 to 4000 cubic feet to rooms occupied by invalids. We may renew the air in a room in an instant by throwing open doors and windows, but this process probably would be attended with danger to the health of the inmates from the violence with which the air currents would enter and leave the room. The most common form of ventilation is the chimney, and with a good fire in an open grate it proves under ordinary conditions to be sufficient. The difference in the weight of hot air and burnt gases in the chimney and the column of air outside supplies the motive force necessary to expel the former. Mechanical ventilation is generally effected by means of gratings in the ceilings or cornices in communication with flues leading into the open air, and a variety of arrangements have been invented to prevent down-draughts. No large public building can be efficiently ventilated without using mechanical force in connection with certain special contrivances. The best method is considered to be the introduction of fresh air by the so-called *plenum* system, and the removal of the foul air by an exhaust fan usually worked by electricity. The plenum system, which is now largely used in hospitals, consists in filtering the air through screens in order to remove solid particles, heating it, if necessary, to a suitable temperature, and then forcing it by means of an electric fan through special channels into the various rooms. The inlets for the fresh air are covered with gratings, and are usually placed about half-way up the wall. The proper ventilation of mines forms a problem for the mining engineer. See *Mining*, and *Sanitary Science*.

Warminster, an old market-town of England, Wilts, on the west side of Salisbury Plain. Pop. 5547.

Warner, CHARLES DUDLEY, American writer, born at Plainfield, Mass., in 1829, graduated at Hamilton College in 1851; studied law and practised in Chicago; became connected with the newspaper press; travelled in Europe; and in 1884 became joint-editor of *Harper's Magazine*. His works include: *My Summer in a Garden*, *Saunterings*, *Backlog Studies*, *My Winter on the Nile*, *In the Levant*, *Washington Irving*, &c. He died in Oct., 1900.

Warner, SUSAN, American writer, born 1819, died 1885. In 1851 she published, under the pseudonym of Elizabeth Weth-

erell, a story of the 'goody-goody' sentimentally pathetic order entitled *The Wide, Wide World*, which was highly popular on both sides of the Atlantic. Queechy (1852) was almost equally so, but her other books had no great success.

Warner, WILLIAM, English author, born about 1558, studied at Oxford, became an attorney and man of letters in London, died in 1609. In 1585 he published seven tales under the collective title of *Pan*, his *Syrinx* or *Pipe*; but his principal work—the one which has kept his name alive—is *Albion's England*, a poem in fourteen-syllable lines, first published in four books (1558), latterly extended to sixteen, dealing with the history of Britain from the days of Noah to James I., and containing an extraordinary hotchpotch of mythology, legend, and more or less genuine history and biography, &c.

War-office, the department of government which controls all matters connected with the army. The head of the department in Britain is the secretary of state for war, who is responsible to parliament, has a seat in the cabinet, and a salary of £5000 a year. See *Army*.

Warp. See *Weaving*.

Warping, in agriculture, a mode of fertilizing poor or barren land by means of artificial inundation from rivers which hold large quantities of earthy matter, or *warp*, in suspension. The operation, which consists in inclosing a body or sheet of water till the warp has deposited, can only be carried out on flat low-lying tracts which may be readily submerged.

Warrandice, Scots law term equivalent to warranty or guarantee.

Warrant, an instrument or document authorizing certain acts which without it would be illegal. Warrants may be divided into royal or executive, judicial, and commercial warrants. The first include *Death*, *Extradition*, *Royal Arms* (authority to use the royal arms), and *Treasury Warrants* (authority to receive payments at the treasury). Common forms of judicial warrants are: the *Warrant of Arrest*, usually issued by a justice of the peace for the apprehension of those accused or suspected of crimes; the *Warrant of Commitment*, a written authority committing a person to prison; the *Distress Warrant*, a warrant issued for raising a sum of money upon the goods of a party specified in the warrant; the *Search Warrant*, an authority, generally

granted to police-officers, to search private premises. Commercial warrants usually authorize the delivery of goods or money, such as *Dock-warrants*, *Dividend Warrants*, &c.

Warrant-officer. See *Officer*.

Warranty, in law, a guarantee or security; a promise or covenant by deed, made by a bargainer for himself and his heirs, to warrant or secure the bargainee and his heirs against all men in the enjoyment of an estate or other thing granted.

Warrington, a mun., parl., and county borough of England, in Lancashire, with a small portion in Cheshire. It is favourably situated on the Mersey, about midway between Liverpool and Manchester. River, canal, and railway communication secure it exceptional carrying facilities. Tanneries, iron, glass, and soap works, cotton-mills, and breweries are numerous and extensive. A dock of about 22 acres in extent has been constructed near Warrington in connection with the Manchester Ship Canal. The town returns one member to the House of Commons. Pop. (parl. bor.), 64,701.

Warrnambool, a seaport town of Victoria, 170 miles south-west of Melbourne. It lies in a fertile agricultural district, and has an extensive trade in wool, flour, and dairy produce with Melbourne. Pop. 7000.

Warsaw, a city of Russia, capital of Russian Poland, or the Vistula Province, as that country is now officially designated. It lies on the left bank of the Vistula, and extends for over 5 miles along that river. Its water communications have long made it one of the most important commercial centres of Eastern Europe, and it is now connected by rail with Moscow, St. Petersburg, S. W. Russia, Dantzic, and Berlin. Two bridges connect it with Praga, a suburb on the right bank of the river. Warsaw is famous for its huge churches, numerous and magnificent palaces and monuments, remnants of former Polish grandeur; for its educational institutions; and for its many and extensive gardens, parks, and suburban drives. It was formerly also exceptionally rich in literature and art treasures; most of these have been confiscated and transferred to St. Petersburg. Leather, boots and shoes, woollen and linen stuffs, plated ware, machinery, chemicals, spirits and beer, are some of the most important industrial products. It is the residence of the governor-general of the province, of the commander of the Warsaw military district, and of the Roman and Greek Catholic arch-

bishops. Pop. 638,209, of which many are Jews and Germans.

War-ship. See *Navy* and *Iron-clad*.

Wart, a small dry hard tumour making its appearance most frequently on the hands, sometimes on the face, and rarely on other parts of the body, and occurring usually on children. Warts may be described as collections of abnormally lengthened papillæ of the skin, closely adherent and ensheathed in a thick covering of hard dry cuticle. In most cases they disappear of themselves, or they may be removed by nitric acid, glacial acetic acid, &c.

Wartburg (vârt'bûr'h), an ancient mountain castle in Germany, near Eisenach, in the Grand-duchy of Saxe-Weimar. It was built in 1067 as a residence for the land-graves of Thuringia. Here, according to the legend, took place the poetic contest known as the 'War of the Wartburg,' between Walther von der Vogelweide and other six eminent poets of Germany, in 1206. It was the residence of Luther in 1521-22, and the room in which the great reformer worked at the translation of the Bible is still shown.

Warthe (vâr'tê), or **WARTA**, a river of Germany. It rises in Poland, 35 miles n.w. of Cracow, flows n. and w., then through Prussia w.n.w., and after watering Posen, joins the Oder at Küstrin. Total length, 483 miles, of which 220 are navigable.

Wart-hog, a name common to certain members of the hog family, genus *Phacocheirus*, distinguished from the true swine by their dentition, which in some respects resembles that of the elephants. The head is very large; immense tusks project from the mouth outwards and upwards, and the cheeks are furnished with flesh-like excrescences resembling warts. They feed on the roots of plants, which they dig up with their tusks. The African wart-hog or haruja (*P. Eliani*) of Abyssinia, and the vlacke-vark of the Dutch settlers of the Cape (*P. æthiopicus* or *Pallasii*) are familiar species.



Head of Wart-hog.

Warton, THOMAS, an English poet and critic, son of the Rev. Thomas Warton, professor of poetry at Oxford, was born at Basingstoke 1728, died at Oxford 1790. He was educated at Winchester, and Trinity College, Oxford, and early distinguished himself by his poetical compositions and criticisms. He

was chosen professor of poetry at Oxford in 1757, a chair he filled with great ability for ten years; appointed Camden professor of history in 1785; and he succeeded Whitehead as poet-laureate in the same year. Several church livings were also held by him. He rendered great service to literature by his *History of English Poetry* (1774-81, three vols.), a work never completed.—His brother, JOSEPH (1722-1800), also deserves mention as a literary critic, and as headmaster of Winchester School (1766-96). To him we owe an essay on the *Writings and Genius of Pope*.

Warwick (wo'rik), a mun. and parl. borough of England, on a rocky hill on the right bank of the Avon, the county town of Warwickshire. The principal object of interest is Warwick Castle, the most magnificent of the ancient feudal mansions of the English nobility. The town unites with Leamington in sending one member to parliament. Pop. 11,889.—The county has an area of 900 sq. miles, or 577,462 acres. The surface is gently undulating, well watered, chiefly by the Avon and the Tame; the soil generally fertile, suitable for grain, root, and pulse crops, and there is a large amount of pasture for dairying and grazing purposes. Coal (output over 3 million tons per annum) and several kinds of building stone are abundant. Warwickshire is also famous for its manufactures, and includes the two great manufacturing towns of Birmingham and Coventry (which see). It returns four members to the House of Commons. Pop. 897,835.

Warwick, RICHARD NEVILLE, EARL OF, 'the kingmaker,' a great English nobleman, born 1428, killed 1471. He was the son of an earl of Salisbury, and became Earl of Warwick by marrying the heiress of the title and estates. Taking the Yorkist side in the Wars of the Roses, he was the main instrument in placing Edward IV. on the throne in 1461 in place of Henry VI., and became the most powerful nobleman in the kingdom. Quarrelling with Edward on account of the latter's marriage, he went over to Henry's side, and was able to place him again on the throne, but was defeated and slain at the battle of Barnet.

Wash, THE, a large estuary on the east coast of England, between the counties of Norfolk and Lincoln. When the tide is full the whole is under water; when out, large stretches are dry. Boston Deep and Lynn Deep give access to sea-going vessels.

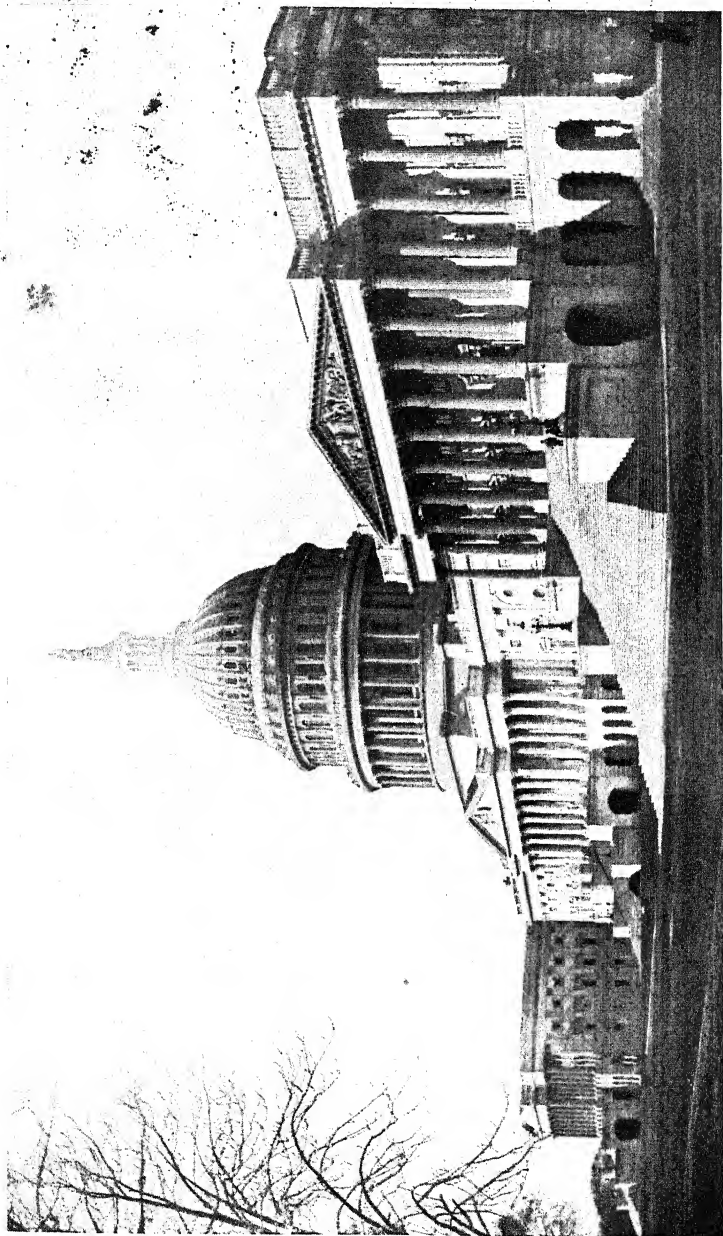


Photo. Frith

WASHINGTON: THE CAPITOL



WASHING-MACHINE—WASHINGTON.

Washing-machine, a machine for washing clothes. A great number of machines have been contrived, the most general feature of them being that the clothes are agitated by artificial means in a vessel or trough containing the cleansing agents. One of the great advantages of the washing-machine as compared with the hands is, that the water can be used when boiling hot. In some provision is made for retaining the steam, which effectually bleaches the clothes, and they generally have also roller attachments for wringing and mangling.

Washington, in the extreme north-west of the United States of America, admitted in 1889 a state of the Union; area, 69,180 sq. miles. Prior to 1861 it also comprised the present states of Idaho and Montana. It is drained by the Columbia and its tributaries, and the elevated Cascade Mountain range runs through the state from N. to S., about 100 miles from the Pacific coast. It is very rich in natural resources and advantages, and the coast district enjoys a climate similar to that of Britain. Coal, iron ore, and timber are abundant, and rich deposits of the precious metals are worked in the N.E. Some parts of the state are admirably adapted for wheat raising, and the Columbia swarms with salmon, which is tinned and exported. There are magnificent natural harbours on the Pacific. Olympia, at the head of Puget Sound, is the capital, but the chief business depot is Seattle, also on Puget Sound. The latter has a university and a fast-growing ship-building and export trade. Pop. of Washington in 1880, 75,116; in 1900, 518,103.

Washington, the capital of the United States, in the District of Columbia, at the confluence of the Anacostia with the Potomac, here navigable by ships of the largest class; 200 miles south-west of New York. The site was selected in 1790 by Washington himself, and the plan of the city was drawn up on a most magnificent scale. The streets (70-120 feet wide) cross each other at right angles, and are intersected diagonally by avenues (120-180 feet wide), which bear the names of states in the Union. A large portion of these spacious thoroughfares are planted with elms and poplars, well paved, and well kept. Numerous open spaces, large and small, some of them beautifully laid out, are distributed throughout the vast area occupied by the town. First among the numerous public buildings ranks the Capitol, the finest structure in the States, on

a hill above the Potomac, in the midst of a highly ornamental park of 50 acres. It consists of a central building of freestone, two wings (each with a dome) of white marble, and a lofty central dome of iron, surmounted by a statue of Liberty (total height, 307½ feet). The Rotunda, in the centre of the main building, is a magnificent hall, adorned with bas-reliefs and paintings, and a colossal statue of Washington. The entire structure covers 3½ acres, and cost over 2½ millions sterling. It accommodates the two Houses of Congress, the U. S. Supreme Court, and until recently also held the extensive Congress Library (now transferred to a separate building). The edifices provided for the various state departments, such as the treasury, the state, war, and navy departments, the interior department, post-office, &c., are also on a splendid scale. In the midst of these palatial offices stands the more modest yet elegant White House, the residence of the U.S. president. In addition may be specially mentioned the Episcopal Trinity Church, the patent-office, the city-hall, the observatory, the Smithsonian Institution, the Columbian College, the arsenal, the navy-yard (42 acres), and the Washington obelisk, built of white marble and blue gneiss, 555½ feet high, with a base 104 feet square. The city is protected by numerous forts and batteries, the harbour defences especially being of a formidable description. P. (1900), 232,745.

Washington, GEORGE, the hero of American independence, and 'the father of the republic' as he is popularly called, was born in Westmoreland county, Virginia, on the 22d Feb. 1732; died at Mount Vernon, 14th Dec. 1799. He was the great-grandson of John Washington, an Englishman, who emigrated in 1657; and the son of Augustine Washington, a substantial farmer, being the eldest of a second family. His education was limited to the elementary subjects, but he acquired a knowledge of mathematics and surveying by self-study, and when his widowed mother prevailed upon him to abandon the idea of entering the British navy, he adopted surveying as a profession. His military career commenced at the age of nineteen, when he was appointed adjutant-general of Virginia militia; and before long he showed in operations against the French that he united in an eminent degree the qualities belonging to a successful commander, though in 1754, when in command of his regiment, he had to capitulate to a superior French force.

In 1755 he accompanied General Braddock as a volunteer, and was almost the only officer who returned safe from the disastrous expedition. In 1758 he took an important part in the expedition that captured Fort Du Quesne, where Pittsburg now stands. In the meantime extensive estates and plantations at Mount Vernon had come into his possession through the death of his half-brother. To these posses-



George Washington.

sions he added largely by marrying in 1759 Mrs. Martha Custis, a wealthy young widow. He also sat for some years in the Virginia Assembly. Shortly after the outbreak of the war of independence Washington was elected commander-in-chief of the American forces, 5th June, 1775, in which capacity his career belongs to the general history of his country. (See *United States, History*.) It is sufficient to say that the struggle was carried on by him under extraordinary disadvantages, including unfriendliness on the part of officers, and virulent attacks on the part of others. When peace was signed in 1783 Washington retired to Mount Vernon, and refused all recompense for his invaluable services beyond his personal expenses. In 1787 he was a member of and presided over the convention which met to revise the articles of union between the states, the result being the constitution which is still in force, and which was adopted in 1788. Washington was elected the first president of the republic, and inaugurated 30th April, 1789, and he was again elected in 1793. During both terms he performed the onerous duties of his office with marked ability, and the advances in prosperity made by the young republic were extraordinary. At the close of his second term of office he resigned (1797), but when a misunderstanding with

France threatened further trouble Congress appointed him lieutenant-general of the forces (1798). He died from an attack of acute laryngitis. Washington had a mind far above party strife, and was mourned by men of all parties. He had no family. Mount Vernon, on the Potomac about 15 miles from Washington, became national property in 1858. His remains are deposited in a vault in the grounds.

Wash'ita, a river of the U. States, in Arkansas and Louisiana, an affluent of the Red River; length, 600 miles; valuable for navigation.

Wasp, the common name applied to insects of various genera belonging chiefly to the family Vespidae, order Hymenoptera. Those best known belong to the genus *Vespa*, and live in societies, composed of females, males, and neuters or workers. The females and neuters are armed with an extremely powerful and venomous sting. Their nests, some of them very ingenious both as regards material and construction, are made in holes underground, or attached to the branches of trees, to walls, &c. The cells are of a hexagonal form, arranged in tiers with the mouth downwards, or opening sideways, in which the larvæ and pupæ are contained. Wasps are very voracious, eating other insects, sugar, meat, fruit, honey, &c. Several species are indigenous in Britain. The hornet (which see) is the largest. The most common species is the *Vespa vulgaris*, which is a ground wasp. N. America has various species similar in habits to those of Europe.

Watch, a well-known pocket instrument for measuring time, invented at Nürnberg in the end of the 15th century. The wheels in watches are urged on by the force of a spiral spring, generally of steel, contained in a cylindrical barrel or box, to which one end of a chain is fixed, the chain also making several turns round the barrel outside; the other end of the chain is fixed to the bottom of a cone with a spiral groove cut on it, known as the fusee (which see). On the bottom of the fusee the first or great wheel is put. The barrel-arbor is so fixed in the frame that it cannot turn when the fusee is winding up. The inner end of the spring hooks on to the barrel-arbor, the outer to the inside of the barrel. If the fusee is turned round in the proper direction it will take on the chain, and consequently take it off from the barrel. This coils up the spring; and if the fusee and

WATCH—WATER.

great wheel are left to themselves, the force exerted by the spring in the barrel to unroll itself will make the barrel turn in a contrary direction to that by which it was bent up. This force communicating itself to the wheels will set them in motion. Their time of continuing in motion will depend on the number of turns of the spiral groove on the fusee, the number of teeth in the first or great wheel, and on the number of leaves in the pinion upon which the great wheel acts, &c. The necessity of keeping the watch from 'running down,' and of making the wheels move with uniform motion, gave rise to the use of the balance-wheel and hair-spring (taking the place of the pendulum of a clock) and the variously and ingeniously designed mechanism, the escapement (which see). On the perfection of the escapement the time-keeping qualities of a watch largely depend. Of the many varieties invented and perfected, watches are now almost exclusively provided with either the horizontal, the lever, or the chronometer or detached escapement. (See *Chronometer*.) In all but the best class English watches the fusee has been abandoned in favour of the going-barrel. The latter offers better facilities for keyless work, and keyless watches are manufactured in increasing quantities. The going-barrel watch can also be produced at a cheaper rate, and for ordinary purposes is amply reliable. The main-spring in this class of watch is very long, but only a few coils are brought into action. The great wheel is attached to the going-barrel itself, thus the spring force is directly transmitted to the escapement. The invention of the spiral hair-spring by Dr. Hooke (about 1658), the scientific application of its properties since, and the intelligent use of compensation (which see) in the balance, have combined to give to the best chronometers of to-day a uniformity of rate which it is probably impossible to excel. A number of watches for special performances are also constructed. Such are the calendar watch, the repeater, the chronograph (which see), &c. Large quantities of the cheaper class of watches are now made by machinery in Switzerland, France, Germany, England, and the United States. They are generally produced on the interchangeable system, that is, if any part of a watch has become unfit for service, it can be cheaply replaced by an exact duplicate; the labour of the watch-repairer thus becoming easy and expeditious.

Watch (nautical), a certain part of the officers and crew of a vessel who together work her for an allotted time, the time being also called a watch. The time called a *watch* is four hours, the reckoning beginning at noon or midnight. Between 4 and 8 P.M. the time is divided into two short or *dog-watches*, in order to prevent the constant recurrence of the same portion of the crew keeping the watch during the same hours.

Water, the commonest liquid in nature. It was classed among the elements until the close of the 18th century, when Lavoisier, profiting by the experiments of Cavendish, proved it to be a compound of hydrogen and oxygen, in the proportion of two volumes of the former gas to one volume of the latter; or by weight 2 parts of hydrogen to 16 parts of oxygen; hence its formula is H_2O . Pure water is a colourless, tasteless, inodorous liquid; a powerful refractor of light; a bad conductor of heat and electricity; it is very slightly compressible, its absolute diminution for a pressure of one atmosphere being only about 51·3 millionths of its bulk. Although water is colourless in small quantities, it is blue like the atmosphere when viewed in mass. It takes a solid form, that of ice or snow, at 32° F. (0° C.), and all lower temperatures; and it takes the form of vapour or steam at 212° F. (100° C.) under a pressure of 29·9 ins. of mercury, and retains that form at all higher temperatures. Under ordinary conditions water possesses the liquid form only at temperatures lying between 32° and 212°. It is, however, possible to cool water very considerably below 32° F. and yet maintain it in the liquid form. Water may also be heated, under pressure, many degrees above 212° F. without passing into the state of steam. The specific gravity of water is 1 at 39°·2 F., being the unit to which the specific gravities of all solids and liquids are referred, as a convenient standard, on account of the facility with which it is obtained in a pure state; one cubic inch of water at 62° F. and 29·9 inches barometrical pressure, weighs 252·458 grains. Distilled water is 815 times heavier than atmospheric air. Water is at its greatest density at 39°·2 F. (= 4° C.), and in this respect it presents a singular exception to the general law of expansion by heat. If water at 39°·2 F. be cooled, it expands as it cools till reduced to 32°, when it solidifies; and if water at 39°·2 F. be heated, it expands as the temperature increases in accordance

with the general law. From the chemical point of view water is neither a distinct acid nor a base, it is neutral. It reacts with a number of chemical substances, such as sodium, potassium, and chlorine. It forms definite compounds with numerous substances, thus it combines with lime to form slaked lime, with sulphur trioxide to form sulphuric acid. Numerous crystalline compounds contain water in a state of combination, known as *water of crystallization*, which is readily removed when the crystals are heated. Examples are blue vitriol, $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$; washing soda, $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$. Of all liquids water is the most general solvent, and on this important property its use largely depends. In consequence of the great solvent power of water it is never found pure in nature. Even in rain-water, which is the purest, there are always traces of carbon dioxide, ammonia, and salt. Where the rain-water has filtered through rocks and soils, and reappears as spring or river water, it is always more or less charged with salts derived from the earth, such as sea-salt, gypsum, and chalk. When the proportion of these is small the water is called *soft*, when larger it is called *hard water*. The former dissolves soap better, and is therefore preferred for washing; the latter is often pleasanter to drink. Some springs contain a considerable quantity of foreign ingredients, which impart to the water particular properties. They are known under the general term *mineral waters*, and according to the predominating constituent held in solution are divided into carbonated waters (alkaline, magnesian, calcareous, and chalybeate), sulphatic waters (containing chiefly sulphates), chlorinated waters (containing chiefly chlorides), and sulphuretted waters (containing large quantities of sulphides or of sulphuretted hydrogen). The only way to obtain perfectly pure water is to distil it, but matter simply held in suspension may be removed by suitable filtration. The great reservoirs of water on the globe are the ocean, seas, and lakes, which cover more than three-fifths of its surface; it evaporates from these as a vapour, and mixed with the air travels over the earth, and can be precipitated in the form of rain, snow, or hail. Water, like air, is absolutely necessary to life, and hence an ample and pure water-supply is one of the first needs of sanitation. See *Water Supply*.

Water-bed, a bed consisting of an india-

rubber mattress filled with water, and generally used by persons confined to bed. Its pliability prevents pressure on the body of the patient, and thus avoids bed-sores. Water-beds have been largely superseded by the more convenient and healthier air-beds (which see).

Water-beetle, the name given to various species of beetles, having legs adapted for swimming, the two hinder pairs being flattened and fringed with hairs. A well-known species is *Dytiscus* (or *Dyticus*) *marginalis* of British ponds. See also *Whirlwig*.

Water-boatman (*Notonecta glauca*). See *Boat-fly*.

Waterbury, a city of the United States, in New Haven county, Connecticut, in a valley on the Naugatuck River, 77 miles north-east of New York. It is an important railway junction and manufacturing town. Brass and brass goods are the staple products. Waterbury machine-made watches and clocks are known throughout the world. Electro-plate is also made. Pop. 45,859.

Water-chestnut. See *Trapa*.

Water-clock. See *Clepsydra*.

Water-colours, in painting, colours carefully ground up with water and isinglass or other mucilage instead of oil. Water-colours are often prepared in the form of small cakes dried hard, which can be rubbed on a moistened palette when wanted. Moist water-colours in a semi-fluid state are also used; they are generally kept in metal tubes, which preserve them from drying up.

Water-cress (*Nasturtium officinale*), a cruciferous plant distributed throughout Europe, Western Asia, North Africa, introduced into North America and certain British colonies, and choking some rivers of New Zealand, where the stem grows as thick as the wrist. It grows on the margin of clear streams, or even partly immersed in the water. It has antiscorbutic properties, and is cultivated near many large towns to be used as salad, or otherwise.

Water-cure. See *Hydrotherapy*.

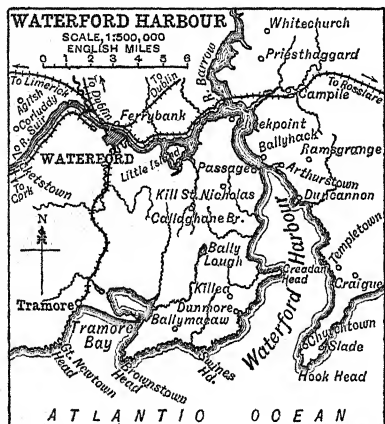
Waterfall. See *Cataract*.

Water-flea, a name given to various genera of small swimming crustaceans belonging to the class Entomostraca. Among the commonest are *Cypris* and *Cyclops* (which see). One very familiar water-flea is the *Daphnia pulex*. See *Daphnia*.

Waterford, a city, parliamentary borough, and seaport in the south-east of Ireland, capital of the county of same name, 97 miles s.s.w. of Dublin, on the right bank of the

WATER-GAS — WATERLOO.

Suir, which soon after joins the Barrow, the combined stream reaching the sea by the fine estuary known as Waterford Harbour. It stretches along the Suir (here crossed by a wooden bridge) for about 1 mile, has quay accommodation for large vessels, and commands a considerable ship-



ping trade, there being a large export of agricultural produce. There are large bacon-curing establishments, breweries, saw and flour mills, &c. The principal buildings are the Episcopal and Roman Catholic cathedrals. There are also a town-hall, court-houses, lunatic asylum, R. C. college, schools, convents, &c. Waterford sends one member to parliament. Pop. 28,768. —The county belongs to the province of Munster. The area is 461,552 acres, or 721 sq. miles, of which about a sixth is under tillage. The coast is in general bold and rocky, and besides the harbours of Waterford and Youghal, has the deep indentations of Dungarvan Harbour and Tramore Bay. The interior is largely rugged and mountainous. The principal rivers are the Suir and the Blackwater. There is a considerable extent of fine land in the south-east, and the hilly districts afford good pasture. Dairying is largely carried on. The fisheries are valuable. The county returns two members to parliament. Pop. 87,187.

Water-gas, a mixture of gases produced by the action of steam on incandescent carbon. The carbon first decomposes the steam, forming hydrogen and carbon di-

oxide, and the latter then combines with more carbon to form the inflammable carbon monoxide. Pure water-gas is non-luminous, but it is rendered luminous by mixing with various gases obtained from petroleum. In the U. States this has largely taken the place of coal-gas as an illuminant, partly because of its brighter light, partly because of its cheapness. The chief objection to water-gas as an illuminant is that carbon monoxide is highly poisonous. Water-gas is also used as a fuel.

Water-glass, a substance which, when solid, resembles glass, but is slowly soluble in boiling water, although it remains unaffected by ordinary atmospheric changes. It consists of the soluble silicates of potash or soda, or a mixture of both. It is prepared either by breaking down and calcining flint nodules, the fragments or particles of which are then added to a solution of caustic potash or soda, whereupon the whole is exposed for a time to intense heat, or by fusing the constituents together in a solid state, and afterwards reducing them to a viscid condition. Among the purposes to which water-glass is applied are painting on glass, coating stone, wood, and other materials to render them waterproof, fixing wall-paintings, making artificial stone and cement, &c.

Water-hen. See *Gallinule*.

Water-hog. See *Capybara*.

Waterhouse, ALFRED, R.A., architect, was born at Liverpool in 1830; studied architecture in Manchester; was successful in the competition for Manchester Assize Courts, and designed Owens College and the Town Hall there. Among his chief works in London are the Natural History Museum at South Kensington, the New University Club, the National Liberal Club, the New St. Paul's Schools, and the City and Guilds' Institute. He partly reconstructed Balliol College, Oxford, and Caius and Pembroke, Cambridge. He was elected R.A. in 1885, and died in 1905.

Water-lily. See *Nymphaeaceae*, *Lotus*, *Nelumbium*, *Victoria Regia*.

Waterloo, a village of Belgium, nearly 10 miles S.E. of Brussels. It is famous for the memorable battle which was fought here on June 18, 1815, and which finally shattered the power of Napoleon. The Prussian defeat at Ligny, and his own unsuccessful engagement at Quatre-Bras on the 16th of June, caused Wellington to retire towards Waterloo, while Blücher concentrated his troops at Wavre, about 10 miles distant.

The whole British position formed a sort of curve, the centre of which was nearest to the enemy. The French forces occupied a series of heights opposite, there being a valley of no great depth, and from 500 to 800 yards in breadth, between them. Each army probably consisted of about 70,000 men. The troops of Napoleon were for the most part veterans, while Wellington had an army composed of troops of various nationalities (Belgians, Brunswickers, Hanoverians, Nassauers) that had never fought together, and a great part of his British troops (about 25,000) were raw levies. The object of Napoleon was to defeat the British, or force them to retreat, before the Prussians, who, he knew, were coming up, could arrive in the field; while that of the Duke of Wellington was to maintain his ground till he could be joined by his allies, when it might be in his power to become the assailant. The French began the battle about noon, and it continued with great fury till evening, when the appearance on the scene of the Prussians caused Bonaparte to redouble his efforts. His imperial guards, which had been kept in reserve, made a final attempt. Wellington's line, however, charged them at the point of the bayonet, and the imperial guard began a retreat, in which they were imitated by the whole French army. The British left the pursuit to the Prussians. The whole French army was dispersed and disabled, and their artillery, baggage, &c., fell into the hands of the conquerors. Their loss in killed, wounded, and prisoners amounted to between 40,000 and 50,000. The allied loss amounted to 23,000 killed and wounded, of whom over 11,000 were British and Hanoverians, 3000 Netherlanders, and 7000 Prussians.

Water-melon. See *Melon*.

Water-ousel, or DIPPER. See *Dipper*.

Water-pitcher, the popular name of plants of the order *Sarraceniacæ*, the leaves of which somewhat resemble pitchers or trumpets in general form.

Water-plantain, the common name of various species of plants of the genus *Alisma*, nat. order *Alismaceæ*. One species, *A. Plantago* (great water-plantain), is a common wild plant in wet ditches and by river sides.

Waterproof Cloth, cloth rendered impervious to water. There are numerous processes for waterproof fabrics of all kinds. The earliest patent, that of Macintosh (1823), consisted in covering cloth with a paste

obtained by dissolving caoutchouc in benzol or coal naphtha. In the treatment of cotton and linen cloth a small proportion of sulphur is generally added. A thin layer of this rubber solution is spread on the fabric by special machinery, after which the cloth is doubled, pressed, and finished in calenders, the waterproof layer being thus in the centre of the finished material. Textiles thus manipulated become also impervious to air, and from a hygienic point of view unsuitable for prolonged personal wear. This led to the introduction of other solutions and methods of application intended to produce fabrics, which, while resisting rain, do not altogether obstruct ventilation. Consecutive dipping of cloths in soap and alum solutions, or in gelatine and gall solutions, or in a solution of acetate of lead and then in a solution of alumina, has been resorted to with more or less success. The substance called algin, obtained from sea-weed, has also been strongly recommended for the same purpose. Another recent patent process consists in treating the fibres in the solution instead of the manufactured textile, and the fabric thus produced, while rain-resisting, offers the same ventilation as ordinary materials.

Water Ram. See *Hydraulic Ram*.

Water-rat. See *Vole*.

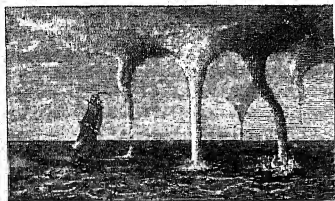
Water-scorpion, the popular name of *Nepa*, a genus of hemipterous insects, the species of which inhabit ponds, &c. Some of them are powerful insects, 2 or 3 inches in length. They receive their popular name from the scorpion-like form of the forelegs, with which they seize their prey.

Watershed. See *Rivers*.

Water-spout, a remarkable meteorological phenomenon frequently observed at sea, and exactly analogous to the whirlwinds experienced on land. It occurs when opposite winds of different temperatures meet in the upper atmosphere, whereby a great amount of vapour is condensed into a thick black cloud, to which a vortical motion is given. This vortical motion causes it to take the form of a vast funnel, which, descending near the surface of the sea, draws up the water in its vortex, which joins in its whirling motion. The whole column, which after the junction extends from the sea to the clouds, assumes a magnificent appearance, being of a light colour near its axis, but dark along the sides. When acted on by the wind the column assumes a position oblique to the horizon, but in calm weather it maintains its vertical position, while at the same time

WATER SUPPLY.

it is carried along the surface of the sea. Sometimes the upper and lower parts move with different velocities, causing the parts to separate from each other, often with a



Water-spout.

loud report. The whole of the vapour is at length absorbed in the air, or it descends to the sea in a heavy shower of rain. What are sometimes called *water-spouts on land*, or *cloud-bursts*, are merely heavy falls of rain of a very local character that occur generally during thunder-storms.

Water Supply. The health and prosperity of a community depend very largely upon the nature and sufficiency of its water supply. For modern requirements it is considered essential that water should be delivered within dwelling-houses and factories in such manner that an abundant supply may be at the service of all, without labour or inconvenience. The first consideration is the selection of a suitable source of supply, which may be a river, lake, spring, well, or a combination of two or more of them, and the water may have to be pumped, or it may be delivered naturally by gravitation, according to the relative levels of the source selected and the district to be supplied. If the supply is drawn from a river, it is probable that the catchment area will contain human habitations and be partly cultivated, and the water will therefore be liable to pollution, and for this reason efficient filtration will be necessary. If from a mountain stream, the catchment area may be entirely above habitations and cultivated lands, in which case the effluent is likely to be of good quality; while, if drawn from springs or wells, exceptional purity is probable on account of the natural filtration to which such waters are subjected. In the case of a river supply, the minimum flow is generally much greater than the maximum quantity required, so that no considerable storage works are necessary, but the flow in a mountain stream is so irregular that a reservoir is

usually required to regulate or average the supply. Such reservoirs are usually designed to contain about 150 days' supply for all purposes, and the yield from their catchment area should be sufficient for the requirements of the district to be supplied and for the compensation water about to be referred to. In calculating the yield, a deduction of about 20 per cent is made from the mean rainfall to provide against dry years, and a further deduction is made for evaporation and percolation. If the source of supply is a lake, it may be necessary to enlarge its capacity and permanently raise the level of the water-surface by building a dam across the outlet. When a stream is dammed a regular daily flow has to be delivered into it from the reservoir to compensate the riparian owners and other interested parties on the lower reaches. This is called the 'compensation water', and is generally fixed at one-third to one-fourth of the mean flow of the stream, on the theory that a regular flow of that extent is as serviceable as the intermittent flow obtained under natural conditions. The quantity of water provided for supply purposes varies greatly in different localities, and it is not unusual in designing new works to allow for as much as three times the existing population. In Great Britain some communities require as little as 15 gallons per head per day, while others require nearly 100 gallons per head. The variation depends largely on the quantity of water required for industrial purposes.

Gravitation supply schemes are in a large majority, and fig. 1 on Plate indicates a typical arrangement. A reservoir is formed by constructing an earthen or masonry dam across a stream in some favourable position. By means of a tower or vertical pipe inside the reservoir, provided with openings and valves at regular intervals, the water is drawn off at a suitable depth, and passes in a culvert or pipe to the outside of the embankment. At this point the compensation water is carefully measured in a gauge-well, and then passed in a regular flow into the stream, while the water for supply purposes is also measured and passed through screens which intercept any coarse matter in suspension. The supply then passes in an open channel or closed conduit to a smaller reservoir or settling-pond, somewhere in the vicinity of the supply district. If not sufficiently pure when it leaves this pond it is passed through filters

and thence into a clear-water tank, and from the tank it is carried in cast-iron mains to the supply district, where it is distributed by means of service-pipes to the consumers. When the source is not at a sufficient elevation to provide the necessary fall, the water is pumped to a water-tower or service reservoir as the case may be, from which it is distributed as in a natural gravitation supply. A typical case is illustrated by fig. 2. Two forms of embankments for impounding reservoirs are illustrated by figs. 3 and 4, the former representing an earth dam and the latter a masonry dam. Earth dams are generally the cheaper to construct, and have been largely adopted in Great Britain. Fig. 5 illustrates a common form of sand-filter, the water being passed through the sand from the top and drained off at the bottom. After the filter has been in use for some time, the coarser matters in the water arrested on the surface of the sand form a layer of sediment, which itself acts as a filtering medium. Wells are a common source of supply, and as a general rule the water has to be raised mechanically. Fig. 6 shows a deep well fitted with an air-lift, by means of which the water is forced up the discharge pipe by compressed air. In this system there are no valves or moving parts in the submerged pipes, which in many respects is a great advantage. See also *Aqueduct, Embankment, Reservoir*.

Waterton, CHARLES, English naturalist, born at Walton Hall, Wakefield, 1782; died 1865. He was educated at the Roman Catholic College at Stonyhurst, where he evinced a great taste for natural history. He spent some years in travel, and published *Wanderings in South America*, which has had great popularity. His only other publication is *Essays in Natural History*, with an Autobiography. He lived a secluded life for many years at Walton Hall, where he formed a curious collection of animals.

Watertown, a city of the United States, New York, on Black River, about 10 miles above its entrance into Lake Ontario. The river rapids afford abundant water-power. Pop. 21,696. — Also a city of the U. States, Wisconsin, on Rock River. Pop. 8487.

Water-vole. See *Vole*.

Water-wheel, a wheel moved by water, as the overshot wheel, the undershot wheel, the breast-wheel, and the turbine. See these terms.

Watford, a town of England, in Hert-

fordshire, on the Colne, giving name to a parl. div. It is well built, and has breweries, corn and paper mills, &c. Here are the London Orphan asylum, a library and college of science, art, &c. Pop. 29,327.

Watlingstreet, one of the Roman military roads in Britain, running from near Dover by London, St. Albans, Dunstable, and Towcester, into North Wales, a branch also extending into Scotland.

Watt, JAMES, the celebrated improver of the steam-engine, was born at Greenock, January 19, 1736; and died at his seat of Heathfield, Staffordshire, August 25, 1819. His father was a merchant and magistrate of Greenock, and James received a good education there. Having determined to adopt the trade of mathematical-instrument maker, he went to London (1754) for instruction, but ill-health compelled him



James Watt.

to return after a year's apprenticeship. Shortly after he endeavoured to establish himself in Glasgow, was appointed in 1757 mathematical-instrument maker to the university, and resided within its walls till 1763. From this time till 1774 he acted as a civil engineer—made surveys for canals and harbours, and some of his plans were afterwards carried out. It was during this period that he gave shape to his chief improvements on the steam-engine. (See *Steam-Engine*.) In order to produce the improved machine he associated himself (1775) in business with Mathew Boulton (see *Boulton*), the firm of Boulton and Watt having their engine-works at Soho, Birmingham.

He retired from business in 1800. Watt was a fellow of the Royal Societies of London and Edinburgh, and member of the National Institute of France. He was twice married, and was survived by one son, who carried on the establishment at Soho in partnership with a son of Mr. Boulton's. Besides improving the steam-engine, Watt invented or improved a variety of mechanical appliances, including a letter-copying press. He was a man of high mental powers generally, and possessed a wide and varied knowledge of literature and science.

Watteau (vát-ô), JEAN ANTOINE, a French painter, born at Valenciennes of poor parents, 1684; died at Nogent-sur-Marne, 1721. In 1702 he went to Paris, and earned his bread by working for decorative painters. For many years he struggled in obscurity, but his talent once recognized, he rapidly became popular and prosperous. In 1717 he was received at the Academy, and enrolled as a painter of *fêtes galantes*, that is, pleasure parties, balls, masquerades, &c., subjects in which he excelled. Lightness, elegance, and brilliancy form the chief attractions of his style.

Wattle-bird, an Australian bird (*Anthochaera carunculata*) belonging to the honey-eaters, and so named from the large reddish wattles on its neck. It is about the size of a magpie, and is of bold, active habits.

Wattle-tree, a name given in Australia to several species of acacia.

Wattle-turkey, a name often given to the brush-turkey. See *Tallegalla*.

Watts, GEORGE FREDERICK, R.A., English artist, born 1817. He first exhibited at the Royal Academy in 1837. In 1843 and 1847 he secured prizes of £300 and £500 from the Commissioners for the Decoration of the Houses of Parliament for his *Caractacus*, and *Alfred Inciting the Saxons to attack the Danes at Sea*; afterwards painting *St. George and the Dragon* for the Parliament Houses, and the *School of Legislation* for Lincoln's Inn. Among his more important pictures are: *Life's Illusion* (1849), *Sir Galahad* (1862), *Ariadne* (1863), *Esau* (1865), *Love and Death* (1877), *Time, Death, and Judgment* (1878), *Happy Warrior* (1884), *Hope* (1886), *Judgment of Paris* (1887), *The Angel of Death* (1888), and *Court of Death* (1902). He is a great idealist, and a subtle and powerful portrait-painter, among his work in this line being portraits of Tennyson, Millais, Sir F. Leighton, Cardinal Manning, Browning, &c. He became

R.A. in 1868, retired in 1896, and died in 1904. He presented many of his works to the nation. He was also a sculptor of mark.

Watts, ISAAC, D.D., English divine and poet, born at Southampton 1674, died at London 1748. In 1702 he became minister of a Dissenting congregation in the metropolis, but ill-health compelled him in 1712 to relinquish his pastoral duties, and henceforth he resided at the house of Sir T. Abney, a London alderman, at Newington. His *Psalms and Hymns*, *Logic*, *Improvement of the Mind*, and sermons deserve special notice.

Waves, in physics, disturbances of matter in such a way that energy is transmitted through great distances, sometimes, but not always, accompanied with a slight permanent displacement of the particles of the conveying medium. When a disturbance is produced at a point in air, waves proceed from that point as concentric spheres and carry sound to the ear of a listener. (See *Sound*.) Light is supposed to be propagated by the wave motion of the ether in a manner somewhat analogous to the propagation of sound in air. (See *Undulatory Theory*.) When waves are produced by the disturbance of a small quantity of liquid, as when a pebble is thrown into a pool, they appear to advance from the disturbed point in widening concentric circles, the height of the wave decreasing gradually as it recedes from the centre; but there is no progressive motion of the liquid itself, as is shown by any body floating on its surface. The whole seems to roll onwards, but, in reality, each particle of water only oscillates with a vertical ascent and descent. Where the depth of the liquid is invariable over its extent, or sufficient to allow the oscillations to proceed unimpeded, no progressive motion takes place, each ridge or column being kept in its place by the pressure of the adjacent columns. Should, however, free oscillation be prevented, as by the shelving of the shore, the columns in the deep water are not balanced by those in the shallower parts, and they thus acquire a progressive motion towards the latter, or take the form of *breakers*, hence the waves always roll in a direction towards the shore, no matter from what point the wind may blow. The height of the wave depends in a great measure on the depth of the water in which it is produced. The waves of the ocean have been known to reach a height of 43 feet, from trough to crest. The horizontal pressure of

a strong Atlantic wave has been recorded as high as 3 tons to the square foot. Undulatory movements also take place in solids; such are earthquake waves.

Wavre (vä'ver), or **WAVREN** (vä've-ren), a town in Belgium, province of Brabant, on the Dyle, 15 miles south-east of Brussels. Pop. 8069.

Wax, an unctuous-feeling substance partaking of the nature of fixed oil. It is secreted by bees, and is also an abundant vegetable production, entering into the composition of the pollen of flowers, covering the envelope of the plum and of other fruits, and, in many instances, forming a kind of varnish to the surface of leaves. Common wax is always more or less coloured, and has a distinct, peculiar odour, of both of which qualities it may be deprived by exposure in thin slices to air, light, and moisture, or more speedily by the action of chlorine. At ordinary temperature wax is solid and somewhat brittle; but it may be easily cut with a knife. Its specific gravity is 0.96. At 155° Fahr. it melts, and it softens at 86°, becoming so plastic that it may be moulded by the hand into any form. Wax is insoluble in water, and is only dissolved in small quantities by alcohol or ether. The principal applications of wax are to make candles and medicinal cerates; to give a polish to furniture or floors; to form a lute or cement, for which it is used by chemists; and to serve as a vehicle for colours. (See *Encaustic Painting*.) Sealing-wax is not properly a wax. See also *Candleberry*, *Carnauba*, *China Wax*, *Wax-palm*.

Wax, MINERAL. See *Ozokerit*.

Wax-bill, a small finch, genus *Estrilda*, so called from its beak being red like wax. It is often kept in cages.

Wax Insects. See *China Wax*.

Wax-myrtle. See *Candleberry*.

Wax-painting. See *Encaustic Painting*.

Wax-palm (*Ceroxylon andicella*), a species of palm yielding a substance consisting of two-thirds resin and one-third wax, which is found on its trunk in the form of a varnish. It is a native of the Andes, towering in majestic beauty on mountains which rise many thousand feet above the level of the sea, and sometimes attaining the height of 160 feet.

Wax-wing (*Ampelis garrula*), an insessorial bird belonging to the denti-rostral section of the order. It derives its name from the appendages attached to the secondary and tertiary quill-feathers of the wings,

which have the appearance of red sealing-wax. The Bohemian wax-wing sometimes visits England. An American wax-wing is the cedar-bird (which see).

Wayfaring-tree, a shrub, a species of *Viburnum*, the *V. Lantana*.

Ways and Means, COMMITTEE OF. See *Supply, Committee of*.

Weald, a valley or tract of country lying between the North and South Downs of Kent and Sussex in England.

Wealden Formation. See *Geology*.

Weapons. See *Arms*.

Wearmouth, BISHOP'S, and MONK WEARMOUTH. See *Sunderland*.

Weasel (*Mustela vulgaris*), a digitigrade carnivorous animal, a native of almost all the temperate and cold parts of the northern hemisphere, and one of the best-known British quadrupeds. It measures about 2½ inches in height, about 7½ in length, with a tail about 2½ inches long. The body is extremely slender, the head small and flattened, the neck long, the legs short. It feeds on mice, rats, moles, and small birds, and is often useful as a destroyer of vermin in ricks, barns, and granaries. The polecat, ferret, ermine, and sable are akin.

Weather. See *Meteorology*.

Weaver-bird, a name given to birds of



Yellow-crowned Weaver and Nest (*P. icterocephalus*).

various genera, belonging to the Fringillidæ or finches. They are so called from the remarkable structure of their nests, which

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are woven in a very wonderful manner of various vegetable substances. Some species build their nests separate and singly, and hang them from slender branches of trees and shrubs; but others build in companies, numerous nests suspended from the branches of a tree being under one roof, though each one forms a separate compartment and has a separate entrance. They are natives of the warmer parts of Asia, of Africa, and of Australia. The *Ploceus icterocephalus*, or yellow-crowned weaver, is a native of South Africa.

Weaving, the art of interlacing yarn threads or other filaments by means of a loom, so as to form a web of cloth or other woven fabric. In this process two sets of threads are employed, which traverse the web at right angles to each other. The first set extends from end to end of the web in parallel lines, and is commonly called the *warp*; while the other set of threads crosses and interlaces with the warp from side to side of the web, and is generally called the *weft* or *woof*. In all forms of weaving the warp threads are first set up in the loom, and then the weft threads are worked into the warp, to and fro, by means of a *shuttle*. It was by this fundamental process of interlacing two sets of thread in looms of simple mechanism that the mummy cloths of Egypt, the fine damasks and tapestries of the Greeks and Romans, the Indian muslins, the shawls of Cashmere, and the famed textile fabrics of Italy and the Netherlands were produced. Until comparatively modern times all weaving was effected by means of the hand-loom. This loom, in its latest form, consists of a frame of four upright posts braced together by cross-beams, the centre beam at the back being the warp beam, the beam in front being that upon which the web is wound, while just below this, in front, is the breast-beam for the support of the weaver at his work. At the top of the loom is an apparatus by which the *heddles* are lifted or lowered by means of *treadles* under the foot of the weaver. These heddles consist of two frames, from which depend cords attached by a loop or eye to each thread in the warp. As these threads are attached to the frames, alternately, it follows that when one heddle is raised every second thread in the warp is also raised, while the remaining threads are depressed; and this is called *shedding the warp*. When the warp threads are thus parted there is left a small opening or shed between the threads, and it is through this

opening that the weaver drives his shuttle from side to side. The shuttle, which is hollow in the middle, contains the weft-thread wound round a bobbin or pirn, and as the shuttle is shot across the web this weft-thread unwinds itself. When the thread is thus introduced it is necessary to bring it to its place in the fabric. This is accomplished by means of the *lay* or *batten*, which is suspended from the top of the loom, and works to and fro like a pendulum by an attachment of vertical rods at each side called the *swords*. Attached to the lay is what is called the *reed*, which is a sort of comb having a tooth raised between every two threads of the warp, and so by driving up the lay after a weft-thread has been introduced the weaver strikes home that thread to its place in the cloth. A great improvement was made upon the hand-loom when John Kay about 1740 invented the fly-shuttle, as it was called. This enabled the weaver to drive the shuttle both ways with the right hand by means of a cord attached to a box or trough placed at each end of the shuttle-race, which impelled the shuttle to and fro at each jerk of the cord. But the most important improvement was made on the hand-loom by Joseph Jacquard of Lyons, who, in 1801, invented an apparatus by which the most intricate patterns could be woven as readily as plain cloth. This is accomplished by an ingenious arrangement of hooks and wires, by means of which the warp-threads are lifted in any order and to any extent necessary to make the shedding required by the pattern. The order in which these hooks and wires are successively lifted and lowered is determined by means of a series of pasteboard cards punctured with holes, the holes corresponding to a certain pattern and the cards passing successively over a cylinder or drum. The hooked wires pass through these holes and lift the warp-threads in an order which secures that the arranged pattern is woven into the fabric. When the pattern is extensive the machine may be provided with as many as 1000 hooks and wires. Another development was made in the art of weaving by the invention of the power-loom by the Rev. E. Cartwright in 1784. In the power-loom, which has been gradually improved and adapted to steam-power, the principal motions of the old method of weaving, such as shedding the warp threads, throwing the shuttle, and beating up the thread, are still retained. The frame of the power-loom is of cast-iron,

and motion is communicated to the loom by means of a shaft, the stroke of the lay being made by cranks attached to the driving shaft, while the shuttle is thrown by means of a lever attachment at the centre of the loom. Although the principle of the loom is the same in all kinds of weaving, yet there are numberless modifications for the production of special fabrics. The lappet loom is one suitable for weaving either plain or gauze cloths, and also for putting in representations of flowers, birds, or the like. *Cross* weaving is a term applied to that process in which, as in gauze weaving, the warp-threads, instead of lying constantly parallel, cross over or twist around one another, thus forming a plexus or interlacing independent of that produced by the weft. *Double* weaving consists in weaving two webs simultaneously one above the other, and interweaving the two at intervals so as to form a double cloth. Kidderminster or Scotch carpeting is the chief example of this process. *Pile* weaving is the process by which fabrics like that of velvets, velveteens, corduroy, and Turkey carpets are produced. In the weaving of these fabrics, besides the ordinary warp and weft, there is what is called the pile-warp, the threads of which are left standing in loops above the general surface till cut, and the cutting of which constitutes the pile.

Weber (vā'bér), KARL MARIA FRIEDRICH ERNST VON, German musical composer, was born at Eutin in Holstein in 1786. His father (a baron) was a musician and had him carefully educated. In 1800 he wrote the opera of the *Waldmädchen* (Wood-maiden), and had it performed at Chemnitz and Freiberg in Saxony. In 1803 he visited Vienna, where he became acquainted with Haydn and the Abbé Vogler, from whom he received great help in his studies. The latter procured him a musical directorship in Breslau, on which he entered in 1804. Two years later he exchanged this post for a similar one at Carlsruhe, and he was subsequently (1813-16) director of the opera at Prague. At the close of 1816 he settled at Dresden, where he was founder and director of the German opera. In 1820 he went to Berlin to bring out *Der Freischütz*, the most celebrated of his compositions. It was performed in London and Paris two years later. In 1822 *Euryanthe* was produced on commission for Vienna, and was brought out there in Aug. 1823. In 1826 Weber visited London to superintend the production of

Oberon, which he had composed for Covent Garden Theatre. It was enthusiastically received. The composer, however, was seriously out of health, and died in London, June 5, 1826. Besides the operas mentioned, Weber wrote a large number of other works. He was a man of high culture, distinguished manners, and upright life.

Webster, DANIEL, a celebrated American statesman, born in 1782, at Salisbury in New Hampshire, studied for four years at Dartmouth College, and having adopted the legal profession, was admitted as a practitioner in the Court of Common Pleas for



Daniel Webster.

Suffolk county. In 1813 he was returned to congress by the Federal party in New Hampshire, and from that period to the close of his life took a prominent part in public affairs, being especially distinguished as an orator. No public speaker could surpass him in producing an impression on an audience. He became a senator in 1828, and in 1836 (and again in 1848) was an unsuccessful candidate for the presidency. In 1841, under the presidency of General Harrison, he was appointed secretary of state, and he had an important part in the arrangement of the Ashburton Treaty of 1842. He was opposed to the admission of Texas as a slave state and to the Mexican war, but supported Clay's 'compromise' of 1850. In 1850 he succeeded General Taylor as secretary of state for foreign affairs under President Fillmore. This office he continued to occupy till his death, which took place at his estate of Marshfield, Massachusetts in 1852. A collection of his speeches, state papers, and correspondence was published at Boston the year before his death.

Webster, JOHN, a dramatic poet of the 17th century, was clerk of the parish of St. Andrew, Holborn, and a member of the Company of Merchant Tailors. His works are: *The White Devil* (1612); *The Devil's Law-case* (1623); *The Duchess of Malfy* (1623); *Appius and Virginia* (1654); *The Thracian Wonder* (1661); and *A Cure for a Cuckold*, a comedy (1661). He also assisted Dekker in writing the *History of Sir Thomas Wyatt*, and the comedies *Westward Ho!* and *Northward Ho!* By some critics he is accounted second only to Shakspeare.

Webster, NOAH, LL.D., lexicographer, born at West Hartford, Connecticut, in 1758, and educated at Yale College. He chose the law as a profession, but relinquished it for teaching (1782). About the same time he began the compilation of books of school instruction, and published his *Grammatical Institute of the English Language*, in three parts, Part 1 (*Webster's Spelling Book*) containing A New and Accurate Standard of Pronunciation; Part 2, A Plain and Comprehensive Grammar; Part 3, An American Selection of Lessons in Reading and Speaking. All these works had an enormous sale. His literary activity was henceforth very great, the works issued by him during the next few years including important legal and linguistic studies. In 1789 he settled at Hartford to practise law, but removed in 1793 to New York, where for some time he devoted himself to journalism. In 1806 he published an 8vo English dictionary, which led the way for his great work, the *American Dictionary of the English Language*. In preparing this work he visited England, and he finished the dictionary during an eight months' residence in Cambridge. In June, 1825, he returned to America. The first edition of his dictionary was published in 1828 (2 vols. 4to); it was followed by a second in 1840; since which time several enlarged and improved editions have appeared. He died in 1843.

Wedge, a piece of wood or metal, thick at one end, and sloping to a thin edge at the other, used in splitting wood, rocks, &c. In geometrical terms it is a body contained under two triangular and three rectangular surfaces. It is one of the mechanical powers, and besides being used for splitting purposes, is employed for producing great pressure, and for raising immense weights. All that is known with certainty respecting the theory of the wedge is that its mechanical power is increased by diminishing the angle

of penetration. All cutting and penetrating instruments may be considered as wedges.

Wedgwood, JOSIAH, a celebrated potter, born at Burslem, in Staffordshire, in 1730. He received little education, and went to work in his brother's factory at the age of eleven. An incurable lameness, the result of small-pox, which subsequently compelled him to have his right leg amputated, forced him to give up the potter's wheel. He removed for a time to Stoke, where he entered into partnership with persons in his own trade, and where his talent for ornamental pottery was first displayed. Returning in 1759 to Burslem, he set up a small manufactory of his own, in which he made a variety of fancy articles. His business improving, he turned his attention to white stoneware, and to the cream-coloured ware for which he became famous; and he succeeded in producing a ware so hard and durable as to render works of art produced in it almost indestructible. His reproduction of the Portland Vase is famous. He also executed paintings on pottery without the artificial gloss so detrimental to the effect of superior work. (See *Wedgwood-ware*.) His improvements in pottery created the great trade of the Staffordshire Potteries. He died in 1795. See *Pottery*.

Wedgwood-ware, a superior kind of semi-vitrified pottery, without much superficial glaze, and capable of taking on the most brilliant and delicate colours produced by fused metallic oxides and ochres; so named after the inventor. It is much used for ornamental ware, as vases, &c., and, owing to its hardness and property of resisting the action of all corrosive substances, for mortars in the laboratory.

Wednesbury, a mun. and parl. borough of England, in Staffordshire, 19 miles S.S.E. of Stafford, in the Black Country, an important seat of wrought-iron and steel manufactures of the most varied kinds. It has an ancient church, town-hall, art gallery, free library, &c. The parl. borough, which includes the parishes of Darlaston and Tip-ton, sends a member to parliament. Pop. of parl. bor. 72,492; of mun. bor. 26,544.

Wednesday, the name of the fourth day of the week (in Latin, *dies Mercurii*, day of Mercury), derived from the old Scandinavian deity Odin or Woden.

Week, a period of seven days, one of the common divisions of time, the origin of which is doubtful. Among the nations who adopted the week as a division of time, the

Chinese, Hindus, Egyptians, Chaldeans, Jews, Persians, and Peruvians have been mentioned, but in some cases the antiquity of the practice is doubtful, and in others the name has been applied to other cycles than that of seven days. The nations with whom the weekly cycle has been traced with certainty to the greatest antiquity are the Egyptians and the Hebrews. With the former we only know of its existence, but with the latter it had a much more important character. The use of the week was introduced into the Roman Empire about the 1st or 2d century of the Christian era from Egypt, and had been recognized independently of Christianity before the Emperor Constantine confirmed it by enjoining the observance of the Christian Sabbath. With the Mohammedans the week has also a religious character, Friday being observed by them as a Sabbath.

Weeks, FEAST OF. See *Pentecost*.

Weeper-monkey, or SAL. See *Sapajou*.

Weeping-ash, *Fraxinus pendula*, a variety of ash differing from the common ash only in its branches arching downwards instead of upwards.

Weeping-birch, a variety of the birch-tree, known as *Betula pendula*, with drooping branches, common in different parts of Europe.

Weeping-willow, a species of willow, the *Salix babylonica*, whose branches grow very long and slender, and hang down nearly in a perpendicular direction. It is a native of the Levant.

Weerd, or WEERT (vårt), a town of Holland, in the province of Limburg. Pop. 9000.

Weever, a name of several acanthopterygious fishes of the genus *Trachinus*, included by many authorities among the perches. Two species are found in the British seas, viz. the dragon-weever, sea-cat, or sting-bull, *T. draco*, about 10 or 12 inches long, and the lesser weever, *T. vipera*, called also the adder-pike, or sting-fish, which attains a length of 5 inches. They inflict wounds with the spines of their first dorsal fin, which are much dreaded. Their flesh is esteemed.

Weevil, the name applied to beetles of the family Curculionidae, distinguished by the

prolongation of the head, so as to form a sort of snout or proboscis. Many of the weevils are dangerous enemies to the agriculturist, destroying grain, fruit, flowers, leaves, and stems. The larva of the corn-weevil (*Calandra granaria*) is very destructive to grain, that of the pea-weevil (*Bruchus pisi*) to peas. See *Corn-weevil* and *Pea-beetle*.

Weft. See *Weaving*.

Weigelia, a genus of shrubs of the order Caprifoliaceæ (honeysuckles), natives of China and Japan, now cultivated in gardens for the beauty of their flowers.

Weighing Machine. See *Balance*.

Weight, the measure of the force by which any body, or a given portion of any substance, gravitates or is attracted to the earth; in a more popular sense, the quantity of matter in a body as estimated by the balance, or expressed numerically with reference to some standard unit. In determining weight in cases where very great precision is desired, due account must be taken of temperature, elevation, and latitude. Hence in fixing exact standards of weight a particular temperature and pressure of air must be specified; thus the standard brass pound of Britain is directed to be used when the Fahrenheit thermometer stands at 62° and the barometer at 30°. See also *Gravity*, and next article.

Weights and Measures, the standards used in accurately weighing and measuring quantities, of especial importance in buying and selling, scientific operations, &c. The origin of the English measures is the grain of corn. Thirty-two grains of wheat, well dried, and gathered from the middle of the ear, were to make what was called one pennyweight; 20 pennyweights were called one ounce; and 20 ounces, one pound. Subsequently, it was thought better to divide the pennyweight into 24 equal parts, to be called *grains*. William the Conqueror introduced into England what was called *troy weight* (which see). The English were dissatisfied with this weight, because the pound did not weigh so much as the pound at that time in use in England; consequently a mean weight was established, making the pound equal to 16 ounces. (See *Avoirdupois*.) But the troy pound was not entirely displaced by the pound avoirdupois; on the contrary it was retained in medical practice, and for the weighing of gold, silver, jewels, and such liquors as were sold by weight. There are 7000 grains in one pound avoirdupois, and 5760 grains in one pound troy;



Corn-weevil (*Calandra granaria*).

a, Insect natural size. b, Insect magnified. c Larva, d Egg (both magnified).

hence the troy pound is to the avoirdupois pound as 14 to 17, or as 1 to 1.215. The troy pound was retained as the British standard by an act passed in 1824; and in order that the standard pound, in case of damage or destruction, might be restored, by reference to a natural standard, it was ascertained that a cubic inch of distilled water, at a temperature of 62° Fahr., weighed, in air, 252.458 grains; and it was directed that the standard pound should be restored by the making of a new standard troy pound, weighing 5760 of such grains. In Britain the unit of lineal measure is the yard, all other denominations being either multiples or aliquot parts of the yard. The length of the imperial standard yard, according to the act of parliament passed in 1824, was the straight line or distance between the centres of the two points in the gold studs in the brass rod in the custody of the clerk of the House of Commons, entitled, *standard yard*, 1760. By the same act, the brass rod, when used, must be at the temperature of 62° of Fahrenheit's thermometer. It was enacted at this time that if this standard should be lost or destroyed, the length of the yard should be determined by reference to the length of a pendulum vibrating seconds of mean time in a vacuum in the latitude of London, at sea-level. When the standard yard was actually destroyed, however, by the fire which consumed the two Houses of Parliament in 1834, the commissioners appointed to restore the standard decided that it was better to do so by means of authentic copies of the old standard that were in existence. This was accordingly done, and five new official copies were made, one of which, to be regarded as the national standard, is preserved at the exchequer in a stone coffin in a window-seat of a groined room. The national standard yard is thus the distance between two fine transverse lines on a square rod of gun-metal 38 inches long. In France the *mètre* is the standard or unit of lineal measure; the *are*, or 100 square metres, the unit of surface measure; and the *stère*, or cube of a *mètre*, the unit of solid measure. The system of measure, called the *decimal* or *metric* system, based upon these standards, is now largely adopted. For all sorts of liquids, corn, and dry goods, the British standard measure is declared by the act of 1824 to be the imperial gallon, which should contain 10 lbs. avoirdupois weight of distilled water weighed in air at the temperature of 62° Fahr., the barometer being at 30 inches.

The official measurement of this quantity of water measured under the specified conditions gave as the result 277.274 cubic inches, which, though since ascertained to be slightly in excess of the true measurement (277.123 cubic inches), is still the legal capacity of the gallon. In the United States the weights and measures are identical with those of Britain. Prior to 1824 there existed a bewildering irregularity in the weights and measures used in Britain; but since then they have been in great measure regulated by statute, and entire uniformity has been introduced. By the statutes the imperial standard yard, pound, and gallon are fixed, and all local measures of capacity abolished. The legal stone is fixed at 14 lbs. avoirdupois. All articles sold by weight must be sold by avoirdupois, except gold, silver, platinum, and precious stones, which, as noted above, are still to be sold by troy weight. An act of 1839 fixes fines for being in possession of false weighing or measuring instruments (but such fines were also in force previously); enforces the official stamping of such measures, and empowers the Board of Trade to create new standards for measuring electricity, temperature, pressure, &c. See *Avoirdupois*, *Troy Weight*, *Decimal System*, &c.

Wei-hai-wei, seaport of N. E. China, leased with adjoining territory to Britain in 1898. It has been improved in various ways, and serves as a naval base and sanatorium for the China squadron. Pop. 150,000.

Weimar (vī'mār), capital of the Grand-duchy of Saxe-Weimar, on the Ilm, in a beautiful valley surrounded by hills. The edifices most deserving of notice are the ducal palace, the so-called Red and Yellow Castles, now united and occupied by several public departments; the public library, containing an extensive collection; the museum; the theatre; the Stadtkirche, with an altar-piece, one of the finest works of Lucas Cranach. Weimar is closely associated with the names of Schiller, Goethe, Herder, and Wieland, the first three of whom are buried here, and statues to all the four adorn the town. The houses of Goethe, Schiller, Cranach, and Herder, are objects of much interest. Pop. 28,329.

Weimar, SAXE. See *Saxe-Weimar*.

Weinheim (vin'hīm), a town in South Germany, in Baden, on the Weschnitz, 10 miles N. of Mannheim, with manufactures of machinery, silk, woollens, &c. Pop. 11,168.

Weir, a dam erected across a river to stop and raise the water, either for the purpose

of taking fish, of conveying a stream to a mill, or of maintaining the water at the level required for navigating it, or for purposes of irrigation.

Weir, **HARRISON**, English artist, was born at Lewes, Sussex, in 1824, and died in 1906. He early taught himself painting, and his first exhibited picture was in oil, and entitled *The Wild Duck* (1843, at the British Institution). In 1847 he was elected a member of the New Society of Painters in Water Colours. He is chiefly noted for his pictures of country life, animals, fruits, flowers, &c. As an illustrator of books and periodicals he was well known. He was the author of *The Poetry of Nature*; *Everyday in the Country*; *Animal Stories*; *Bird Stories*; *Our Cats*; and the large work, *Our Poultry and All About Them*.

Weissenburg (vi'sen-burg), a town of Germany, in the province of Alsace-Lorraine, at the foot of the Vosges Mountains, on the Lauter, 34 miles N.N.E. of Strasburg. In the Franco-German war of 1870-71 a battle took place at Weissenburg on Aug. 4, 1870, the first important engagement between the two armies, in which the French were defeated. Pop. 6946.

Weissenfels (vi'sen-fels), a town of Prussia, in the government of Merseburg, in the province of Saxony, on the Saale, with manufactures of porcelain, shoes, woollen fabrics, gold and silver articles, &c. It has a church containing the remains of Gustavus Adolphus. Pop. 30,900.

Weld. See *Dyer's-weed*.

Welding is the union produced between the surfaces of pieces of malleable metal when heated almost to fusion and hammered. When two bars of metal are properly welded the place of junction is as strong, relatively to its thickness, as any other part of the bar. Practically, iron is the only metal welded.

Welle. See *Mobangi*.

Wellesley, **PROVINCE OF**. See *Penang*. **Wellesley** (welz'li), **RICHARD COLLEY**, **VISCOUNT AND MARQUIS**, and **Earl of Mornington**, eldest son of Garrett, first earl of Mornington, and eldest brother of the Duke of Wellington, was born at Dublin in 1760, and educated at Eton and at University College, Oxford. On his majority he took his seat as Earl of Mornington in the Irish House of Peers, and three years after was returned to the British House of Commons as member for Beeralston. Thus, by a curious anomaly, he was at once a peer and a com-

moner. He distinguished himself in 1789 in the debates on the regency question. In this discussion, his defence of the royal prerogative, made known to George III. after his recovery, pleased him so much that the earl at the next general election was returned for Windsor, and made a member both of the Irish and the English privy-council. These were only preliminaries to the higher appointment of Governor-general of India, which was conferred upon him in 1797, along with a British peerage under the title of **Baron Wellesley**. His administration forms an era in the history of the British Indian Empire. He returned to England in 1805, and in 1809 became foreign secretary under Mr. Perceval. In 1812 he resigned his place, chiefly because he was in favour of Catholic emancipation. He did not return to office till 1822, when he became Lord-Lieutenant of Ireland. This post he retained till 1827. In the Grey ministry he again (1833) became Lord-Lieutenant of Ireland, but finally retired from public life in 1835. He died in 1842.

Wellingborough, a town of Northamptonshire, on the river Nen, 10½ miles north-east of Northampton. It has a handsome parish church, a grammar-school, and a corn exchange, accommodating also a literary institute. The principal industries are the manufacture of boots and shoes, and the smelting of iron. Pop. 18,412.

Wellington, a town (and parl. div.) of England, in Shropshire, 11 miles east of Shrewsbury, with manufactures of farm implements, brass and iron ware, &c. Pop. 6283.

Wellington, a town (and parl. div.) of England, in Somerset, with manufactures of woollens. From this place the Duke of Wellington took his title. Pop. 7283.

Wellington, the capital of New Zealand, is situated on Port Nicholson, an inlet of Cook's Strait, on the south-west extremity of the provincial district of Wellington, North Island. Its harbour is 6 miles long and 5 wide. It has two wharfs and a patent slip. The principal buildings are the Government House, the Houses of Legislature, the Government Buildings (an enormous wooden building), the Supreme Court, the post and telegraph offices, the cathedral and other churches, the Colonial Museum, theatres, Wellington College, a Roman Catholic college, &c. It has several daily and weekly newspapers, botanic gardens, tramways, &c.; and is lighted by electricity. Pop. 49,344. —The provincial district of Wellington has

WELLINGTON.

an area of 11,250 sq. miles. It has an equable and healthy climate, but is subject to earthquake shocks. It is intersected by several mountain ranges, but there are many fine agricultural and pastoral districts. Gold was found in 1881. The chief rivers are the Manawatu and Wanganni, both navigable. Pop. 141,236.

Wellington, ARTHUR WELLESLEY, DUKE OF, born in 1769, was the third son of the first Earl of Mornington, and was educated at Eton, at Brighton, and finally at the Military College of Angers. In 1787 he received a commission as ensign in the 73d Foot, and after a rapid series of changes and promotions, attained by purchase in 1793 the command as lieutenant-colonel of the 33d Regiment. During 1794 and 1795 he served with his regiment under the Duke of York in Flanders. In 1796 his regiment was despatched to Bengal, Colonel Wellesley landing at Calcutta in Feb. 1797 at a critical moment for the British power in India. War had just been declared against Tippoo Saib, and an army of 80,000, of which Colonel Wellesley's regiment formed part, marched against him. An engagement took place at Mallavelly (Mysore) on the 27th, in which Wellesley, who commanded the left wing, turned the right of the enemy. He was subsequently employed to dislodge the enemy from their posts in front of Seringapatam, and after the capture of that capital he was appointed, in 1799, to the administration of Mysore, his brother being at this time governor-general. (See *Wellesley*.) In 1802 he attained the rank of major-general, and in the following year he was appointed to the command of a force destined to restore the Peishwa of the Mahrattas, driven from his capital by Holkar. After this operation had been successfully performed the other Mahratta chiefs, Scindia and the Rajah of Berar, showed hostile designs against the British, and Wellesley was appointed to the chief military and political command in the operations against them. After an active campaign, in which he took Ahmednuggur and Arungabad, he encountered a powerful Mahratta army, assisted by French officers, at Assaye, on 23d September, and entirely defeated it. The parallel successes of General Lake, and the defeat of the Rajah of Berar by Wellesley at Argaum on 29th November, compelled the submission of the Mahrattas, and peace was restored on conditions drawn up by the successful general. Early in 1805, his health

failing, Wellesley obtained leave to return home, and arrived in England in September. He had before leaving Madras received his appointment as Knight Commander of the Bath. From November to February he was engaged as brigadier-general in Lord Cathcart's expedition to the Continent, which was without result. In January 1806 he succeeded Lord Cornwallis as colonel of his own regiment, the 33d. On 10th April, 1806, he married Lady Catherine Pakenham, third daughter of the Earl of Longford. He was shortly afterwards elected M.P. for Rye, and in April 1807 was appointed secretary of state for Ireland. In August he received the command of a division in the expedition to Copenhagen under Lord Cathcart and Admiral Gambier, and took Kioge on April 29, the only land operation of importance. On April 28, 1808, he attained the rank of lieutenant-general, and in June received the command of a force destined to operate in the north of Spain and Portugal. He was subsequently superseded; but before giving up the command he gained the battle of Vimeira over Junot, the campaign being brought to a close with the convention of Cintra, by which the French agreed to evacuate Portugal. In 1809 Wellesley was appointed to take the chief command in the Peninsula, which had been overrun by the French. The famous passage of the Douro, and the defeat of Soult which followed, fittingly opened this masterly campaign. For the victory at Talavera (July 28), the first of a long list that subsequently took place in the Peninsula, the government raised the commander-in-chief to the peerage as Viscount Wellington. Towards the end of 1810 Wellington fought the battle of Busaco, which was followed by the famous fortification and defence of the lines of Torres Vedras. A little later (in 1811) occurred the victory of Fuentes de Onoro. In the following year he took Ciudad Rodrigo and Badajoz by storm, and fought the battle of Salamanca, accounted one of his most famous victories. On August 12, 1812, Wellington entered Madrid. For his brilliant conduct of the campaign thus far he received the thanks of parliament, was raised to the dignity of marquis, and a sum of £100,000 was voted to purchase him an estate. Next followed the battle of Vittoria (June 21, 1813), for which decisive victory Wellington was given the baton of field-marshal; then battles in the Pyrenees, the capture of San Sebas-

tian, and the crossing of the Bidassoa into France. In 1814 the battle of Orthez was gained, and in the same year the battle of Toulouse, in which Soult's best troops were routed, and the hopes of France in the Peninsula utterly annihilated. The way was now open for the British troops to the heart of France. In six weeks, with scarcely 100,000 men, Wellington had marched 600 miles, gained two decisive battles, invested two fortresses, and driven 120,000 veteran troops from Spain. Napoleon abdicated on April 12, and a few days later the war was brought to a close by the signing of conventions with Soult and Berthier. In May the triumphant general was created Marquis of Douro and Duke of Wellington, with an annuity of £10,000, commuted afterwards for £400,000. He received the thanks of both Houses of Parliament. In July he went as ambassador to France, and succeeded Lord Castlereagh as British representative in the Congress of Vienna. In April he took the command of the army assembled in the Netherlands to oppose Napoleon. (See *France* and *Waterloo*.) On his return to England after the restoration of peace he received a vote of £200,000 for the purchase of the estate of Strathfieldsaye, to be held on presenting a coloured flag at Windsor on the 18th of June each year. With the return of peace he resumed the career of politics. He accepted the post of master-general of the ordnance with a seat in the cabinet of Lord Liverpool in January, 1819. In 1822 he represented Great Britain in the Congress of Vienna. In 1826 he was appointed high-constable of the Tower. On 22d Jan. 1827, he succeeded the Duke of York as commander-in-chief of the forces. On 8th January, 1828, he accepted the premiership, resigning the command of the forces to Lord Hill. In January 1829 he was appointed governor of Dover Castle and lord warden of the Cinque Ports. In 1830 repeated motions for parliamentary reform were defeated, but the growing discontent throughout the country on this subject and a defeat in parliament caused the resignation of the government in November. His opposition to reform made the duke so unpopular that he was assaulted by the mob on 18th June, 1832, and his life endangered. He accepted office under Sir Robert Peel in 1834-41, and again in 1846, when he helped to carry the repeal of the corn-laws, which till then he had opposed. In 1842 he resumed the command of the forces on the

death of Lord Hill. He died at Walmer Castle, 14th September, 1852. His despatches, letters, speeches, conversation, &c., have been published. His life has been written by Gleig and others, the history of his Peninsular campaigns by Napier.

Wellingtonia. See *Sequoia*.

Wells, a city of England, in Somersetshire, 19 miles south-west of Bath. United with Bath it gives the title to a bishop's see. It contains one of the most magnificent cathedrals in England, 415 feet long, with a transept measuring 155 feet, a central tower 155 feet, and two western towers each 126 feet high. Pop. 4849. Wells gives name to a parl. div. of the county.

Welsh Onion. See *Cibol*.

Welshpool, a mun. and parl. bor. of Wales (Montgomery dist.), county town of Montgomeryshire, on the Severn. It carries on the woollen manufacture. Pop. 6121.

Welwitschia (wel-wich'i-a), a remarkable plant growing in Southern Africa in dry regions near the western coast, between lat. 14° and 28° s. It presents a stem or rhizome forming a woody mass rising to a foot at most above the ground, and having a diameter of from 4 to 5 inches to as many feet, this mass bearing the two original cotyledonary leaves, which, when they reach their full development of 6 feet in length or so, become dry and split up into shreds but do not fall off. Every year several short flower-stalks are developed at the base of these leaves, but no other leaves are produced. There seems to be but one species, *W. mirabilis*. It is placed among the Gnetaceæ.

Wen, an encysted tumour occurring on the scalp or other parts of the body. They are formed by the accumulation of sebum in a hair follicle, or in the recesses of the sebaceous gland of the hair sac, causing distension of the sac. An encysted tumour, in its commencement, is always exceedingly small, and perfectly indolent; and it is often many years before it attains any great size. The best mode of treatment is complete removal of the whole swelling by dissecting it out.

Wends, the name of a section of the Slavonic race, now dwelling mostly in that part of Germany known as Lusatia, partly in Prussia, partly in the Kingdom of Saxony. In the 6th century the Wends were a powerful people, extending along the Baltic from the Elbe to the Vistula, and southwards to the frontiers of Bohemia. They comprised a variety of tribes. The favourite occupation of the Wends was, and still is, agricul-

ture. There are several dialects of the Wend language still extant.

Wener, the largest lake of Sweden, and after those of Ladoga and Onega the largest in Europe, situated in the south-west of the kingdom. It is 147 feet above sea-level, and of very irregular shape. Its greatest length, north-east to south-west, is about 100 miles; and its breadth may average about 30 miles; area, 2306 square miles. Its chief feeder is the Klar. By a canal it communicates with Lake Wetter, but its only proper outlet is at its south-western extremity, where its superfluous waters are received by the river Gotha. In winter it is frozen for several months, and crossed by sledges. It abounds with fish.

Wenlock, a municipal borough of England, in Shropshire, 12 miles south-east of Shrewsbury. It comprises Much Wenlock, Broseley, Madeley, Coalbrookdale, &c. There are large iron and other industries. It returned two members to parliament till 1885. Pop. 15,866.

Wenlock Group, in geology, that subdivision of the Silurian system lying immediately below the Ludlow rocks, and so called from being typically developed at *Wenlock*. See *Geology*.

Wentletrap. See *Scalaria*.

Wentworth, SIR THOMAS, Earl of Stratford. See *Stratford*.

Werdau (ver'dou), a town of Saxony, on the river Pleisse, 25 miles w.s.w. of Chemnitz, with extensive manufactures of yarn and worsted, machinery, &c. Pop. 19,355.

Werden, a manufacturing town of Rhenish Prussia, 15 miles north-east of Düsseldorf. Coal-mining is carried on in the vicinity. Pop. 11,000.

Werewolf, a man-wolf, a man transformed into a wolf according to a superstition prevalent in ancient and mediæval times. It was generally thought that such beings had the form of a man by day, and that of a wolf by night.

Werff, ADRIAAN VAN DER, a Dutch painter, born near Rotterdam in 1659, died there in 1722. He was a pupil of Van der Neer, and among his celebrated paintings are the Judgment of Solomon, Christ carried to the Sepulchre, Ecce Homo, Abraham with Sarah and Hagar, and Magdalen in the Wilderness. Van der Werff was particularly noted for his small historical pieces, which are most exquisitely finished, and still in high request.—His brother and pupil, PIETER VAN DER WERFF (born 1665), painted por-

traits and domestic pieces, and was a very able artist. Died 1718.

Wergild, WERGYLD. See *Anglo-Saxons*.

Werner (ver'nér), ABRAHAM GOTTLÖB, a German mineralogist, born 1750, died 1817. In 1775 he was appointed inspector and teacher of mineralogy and mining in the Mining Academy at Freiberg, in which position he remained for the rest of his life. Werner was the first to separate geology from mineralogy, and to place the former on the basis of observation and experience. The great geological theory with which his name is connected is that which attributes the phenomena exhibited by the crust of the earth to the action of water, and is known as the Wernerian or Neptunian theory, in distinction to the Huttonian or Plutonic, in which fire plays the chief part.

Wernigerode (ver'ni-ge-rö-dé), a town of Prussia, in the province of Saxony, 43 miles south-west of Magdeburg, at the foot of the Hartz Mountains. It has several interesting ancient Gothic buildings, a residence of the Counts Stolberg-Wernigerode, with a library of 96,000 volumes, &c. Pop. 11,567.

Werra (ver'rä). See *Weser*.

Wesel (vä'zl), a river port (and till recently a fortress) in Rhenish Prussia, at the confluence of the Rhine and Lippe, both spanned by bridges, 30 miles N.N.W. of Düsseldorf. It contains the old Gothic church of St. Willibrord, recently restored, a fine old Gothic town-house, and many quaint buildings. The manufactures comprise soap, wire, cement, &c. Pop. 22,545.

Weser (vä'zér), a river of Germany, formed by the junction of the Fulda and Werra at Münden, flows generally in a north-west direction, and, after a very circuitous course, traverses the city of Bremen, and then falls by a wide mouth, very much encumbered with sand-banks, into the German Ocean. Its length, including the Werra, is about 430 miles. The navigation for vessels of large size ceases about 10 miles below Bremen. See *Bremen*.

Wesley, CHARLES, younger brother of John Wesley, was born at Epworth, 1708, and educated at Westminster School and Christ Church, Oxford. He accompanied his brother to Georgia as an ordained clergyman, but after his return to England he became, in 1738, a preacher in the Methodist connection, and materially assisted the success of the movement by his numerous hymns, large collections from which have been frequently published. He died in 1788.

Two of his sons, Charles and Samuel, were celebrated for musical genius.

Wesley, JOHN, the founder of Wesleyan Methodism, was born at Epworth, Lincolnshire (his father being rector of the parish), June 17, 1703, and educated at the Charterhouse, and at Christ Church, Oxford. He took his degree of B.A. in 1724, was ordained deacon in 1725, became a fellow of



John Wesley.

Lincoln College, and lecturer and moderator in classics in 1726; and took priest's orders in 1728. He now gathered together a number of pupils and companions who met regularly for religious purposes, and by so doing acquired the name of Methodists. Among these companions were Hervey, Whitefield, and Law, the author of the *Serious Call to the Unconverted*. In 1735 Wesley accepted an invitation from General Oglethorpe to go out to America to preach to the colonists of Georgia. After a stay of two years he returned to England (Feb. 1738), and in the following May an important event took place in his inner religious life, namely, his conversion. In June he paid a visit to Herrnhut, the Moravian settlement, returning to England in September. Early in the following year (1739) he began open-air preaching, in which he was closely associated with Whitefield, from whom, however, he soon separated, but without a permanent personal breach. Having now the sole control of the religious body which adhered to

him, he devoted his entire life without intermission to the work of its organization, in which he showed much practical skill and admirable method. His labours as an itinerant preacher were incessant. He would ride from 40 to 60 miles in a day. He read or wrote during his journeys, and frequently preached four or five times a day. He married in 1750 Mrs. Vizzelle, a widow with four children, but the union was unfortunate, and they finally separated. He died 2d March, 1791. He held strongly to the principle of Episcopacy, and never formally separated from the Church of England. His collected works were published after his death in thirty-two vols. 8vo. He contributed to the collection of hymns, the greater part of which were written by his brother Charles. See *Methodists*.

Wesleyan Methodists. See *Methodists*.

Wessex, that is, WEST SAXONS, one of the most important of the Anglo-Saxon kingdoms in England during the 6th, 7th, and 8th centuries, and the early part of the 9th, and that in which the other kingdoms were ultimately merged in the reign of Egbert in 827. It included the counties of Devon, Dorset, Somerset, Wilts, Hants, Berks, and a part of Cornwall.

West, BENJAMIN, painter, born at Springfield, Pennsylvania, in 1738; died in London in 1820. He showed great precocity in his aptitude for painting, and at the age of eighteen established himself as a portrait-painter at Philadelphia. In July 1760 he visited Italy, and settling in Rome painted Cimon and Iphigenia, and Angelica and Medora. He visited England in 1763, and was so well patronized that he determined to make it his future residence. He painted Hector and Andromache, The Return of the Prodigal Son, and a historical painting of Agrippina, the last for the Archbishop of York, who introduced him to George III., who became his steadfast patron, and gave him commissions to the extent of about £1000 a year for upwards of thirty years. He painted a series of historical works for Windsor, and for the oratory there a series on the progress of revealed religion. On the death of Reynolds, in 1792, he was elected president of the Royal Academy. He afterwards painted a number of religious and historical pictures of large size, among them being Christ Healing the Sick (in the National Gallery), the Crucifixion, Ascension, and Death on the Pale Horse. The Death of General Wolfe at Quebec and The

WEST AFRICAN COLONIES — WEST INDIES.

Battle of La Hogue are accounted the best of his historical pieces. 'The 400 historical pictures which he painted show skill in composition and considerable inventive power, but they have no real vitality.' Tame in style and monotonous in colour, they now possess little interest. Many of his works have been engraved.

West African Colonies, of Britain, Nigeria, the Gold Coast, Gambia, and Sierra Leone (which see). France and Germany have also colonies here. See *Africa*.

West Bay, a city of Bay county, Michigan, U.S., on the Saginaw river, near its mouth, and opposite Bay City. It has an extensive trade in lumber. Pop. 13,119.

West Bromwich, a municipal, county, and parl. borough of England, in Staffordshire, $5\frac{1}{2}$ miles north-west of Birmingham. It is the centre of a mining and manufacturing district, and has grown largely of late years. It sends one member to parliament. Pop. 65,175.

Westbury, an ancient town (and parl. div.) of England, county of Wilts, on a plain, 21 miles N.W. of Salisbury; with manufactures of woollen cloths. Pop. 3305.

Westchester, a town charmingly situated in a fertile district of Pennsylvania, U.S., 23 miles west of Philadelphia. Pop. 9528.

West Derby, a parl. div. in Lancashire, forming a wealthy residential suburb of Liverpool. Pop. 86,694.

Western Australia, a British colony which includes all that portion of the continent situated westward of 129° E. lon. The territory measures 1490 miles from north to south, and 850 miles from east to west. The total estimated area is 975,920 square miles, thus making it the largest of the Australian colonies. The really occupied portion, apart from scattered settlements round the coasts, is almost entirely in the south-west, and is about 600 miles in length, and 150 miles in average breadth. Western Australia was first settled in 1829 as the Swan River Settlement, and for many years the population was very small; but in 1901 it had risen to 184,124, having rapidly increased with the extension of gold-mining since 1886. In 1850 the colony was made a convict station, and it remained such till the abolition of transportation in 1868. In 1890 it was granted responsible government. It is now a state of the Australian Commonwealth, with six representatives in the federal Senate and five in the House of Representatives. It has a

parliament for its own affairs, consisting of a legislative council of thirty members and a legislative assembly of fifty. Perth is the capital, on Swan River, and Fremantle is the next largest town and the chief seaport. Besides this river there are, in the south-west, the Blackwood, Murray, Murchison, &c.; farther north, the Gascoyne, Ashburton, Fortescue, Fitzroy, &c.; none of them useful for navigation. The interior is in great part sterile, with extensive tracts of sand, scrub, and salt marsh; but the colony is as yet imperfectly known. The pleasantest climate is in the south-west. Here there are forests, which supply valuable timber for exportation, especially the varieties known as jarrah and karri. The cultivated area is at present small, the chief cereal crop being wheat. Fruit is being cultivated to an increasing extent, and the wine-producing area is extending. There are splendid pastures in the north of the colony, and wool is one of the chief products. Western Australia has become the principal gold-producing state of Australia, its output being now valued at about £8,000,000 per annum. The chief gold-mining districts are Coolgardie and Kalgoorlie. Other minerals are silver, copper, tin, and coal. The revenue and the expenditure usually amount to about £4,000,000 each. The public debt is £16,643,000. Education is well provided for, and is compulsory. There are now about 2300 miles of railway. The chief exports are gold, timber, wool, pearls, hides and skins. Total exports in 1905, £9,871,000; imports, £6,482,000.

Western Empire. See *Rome*.

Western Islands. See *Hebrides* and *Azores*.

West Ham, a London parl. and county borough created in 1885, co. Essex, about 4 miles E.N.E. of St. Paul's. It returns two members to parliament. Pop. 267,358.

Westhoughton, an urban dist. and parl. div. in Lancashire, 5 miles W.S.W. of Bolton, with manufactures of silk and cotton, and coal-mining. Pop. 14,377.

West India Apricot. See *Mammec-tree*.

West Indies, also called the *ANTILLES*, the extensive archipelago which lies between North and South America, stretching from Florida to the shores of Venezuela. It is divided into the Bahamas, the group stretching from near the coast of Florida in a southeasterly direction; the Greater Antilles, comprising the four largest islands of the group, Cuba, Hayti, Porto Rico, and Jamaica;

and the Lesser Antilles, stretching like a great bow, with its convexity towards the east, from Porto Rico to Trinidad, near the coast of Venezuela. Almost the whole archipelago lies within the torrid zone. The total area does not exceed 95,000 square miles, of which the Greater Antilles occupy nearly 83,000 square miles. The climate is extremely hot, and the islands abound in tropical productions, as sugar, cotton, coffee, tobacco, cocoa, maize, &c.; bananas, oranges, lemons, limes, pomegranates, citrons, pine-apples, manioc, yams, &c. The chief exports are sugar, tobacco, fruits, coffee, cocoa, rum, &c. A number of the West Indian islands are still in the possession of European powers. The chief *British* possessions are: Jamaica, Barbadoes, St. Lucia, St. Vincent, Trinidad, Tobago, Antigua, St. Kitt's, Dominica, Virgin Islands, and the Bahamas. — *Dutch*: St. Eustatius, Saba, St. Martin (partly French), Bonaire or Buen Ayre, Curaçao, and Oruba or Aruba. — *French*: Martinique, Deseada, Guadeloupe, Marie Galante, St. Martin (partly Dutch), St. Bartholomew, Les Saintes. — *United States*: Porto Rico. — *Danish*: Santa Cruz, St. Thomas, and St. John. Cuba is independent under the suzerainty of the United States.

Westland, a provincial district of the southern island of New Zealand, is bounded by the provinces of Canterbury, Nelson, and Otago, and by the Pacific Ocean. It is a long narrow strip about 200 miles in length, with an average breadth of 30 miles. Considerable quantities of gold have been obtained. Among other minerals are coal, lead, silver ore (galena), copper, iron, and tin. The capital is Hokitika. Pop. 14,469.

Westmacott, SIR RICHARD, sculptor, born in London in 1775. In 1793 he went to Rome to study under Canova, and made such progress that he gained the pope's annual gold medal for sculpture. He also obtained a first prize for sculpture at Florence. In 1798 he returned to England, and rose rapidly in his profession. Many of the monuments in St. Paul's are from his chisel. He designed also the Achilles in Hyde Park, the statue of Lord Erskine in Lincoln's Inn Old Hall, that of Nelson in the Liverpool Exchange, besides statues of Addison, Pitt, &c. He was elected an associate of the Royal Academy in 1805, a full member in 1816, and in 1827 succeeded Flaxman as lecturer on sculpture. In 1837 the dignity of knighthood was conferred on him. He died in 1856.

Westmeath, a county in Ireland, in the province of Leinster, with an area of 434,000 acres. The surface is hilly in the north, but elsewhere undulates gently. The drainage is shared between the Shannon and the Boyne. The former, with its expansion Lough Ree, forms the western boundary of the county; other rivers are the Brosna and the Inny; and there are a number of lakes. The principal grain-crop is oats, but the larger part of the available surface is devoted to grazing. Important means of communication are furnished by the Shannon, the Royal Canal, and a branch of the Grand Canal. Westmeath sends two members to parliament. The county town is Mullingar. Pop. 61,527.

Westminster, a city, parl. and mun. bor. of Middlesex, England, in what is now the county of London. The city and metropolitan borough of Westminster are co-terminous, having on the south and east the Thames; east, the city of London (at Temple Bar); north, Holborn, Marylebone, and Paddington; west, Kensington and Chelsea. The parliamentary borough is much smaller. Within the city area are Westminster Hall and Abbey, the Houses of Parliament, royal palaces, chief government buildings, &c. (See *London*.) Westminster had a royal residence as early as the time of Edward the Confessor. Pop. (city and met. bor.), 183,011; parl. bor., 50,790.

Westminster Abbey, the coronation church of the sovereigns of England, and one of the chief ornaments of London, is a magnificent Gothic pile, situated near the Thames, and adjoining the Houses of Parliament. In 1065 a church was built here in the Norman style by Edward the Confessor. Part of this structure still remains in the pyx-house and the south side of the cloisters; but the main building, as it now stands, was begun in 1220 by Henry III. (who built the choir and transepts), and was practically completed by Edward I. Various additions, however, were made (including the nave and aisles, the west front, and the Jerusalem Chamber) down to the time of Henry VII., who built the chapel which bears his name, while the upper parts of the two western towers were designed by Sir C. Wren. The extreme length of the church, including Henry VII.'s chapel, is 531 feet; breadth of transepts, 203 feet; height of the roof, 102 feet; height of towers, 225 feet. The coronation ceremony takes place in the choir, where the

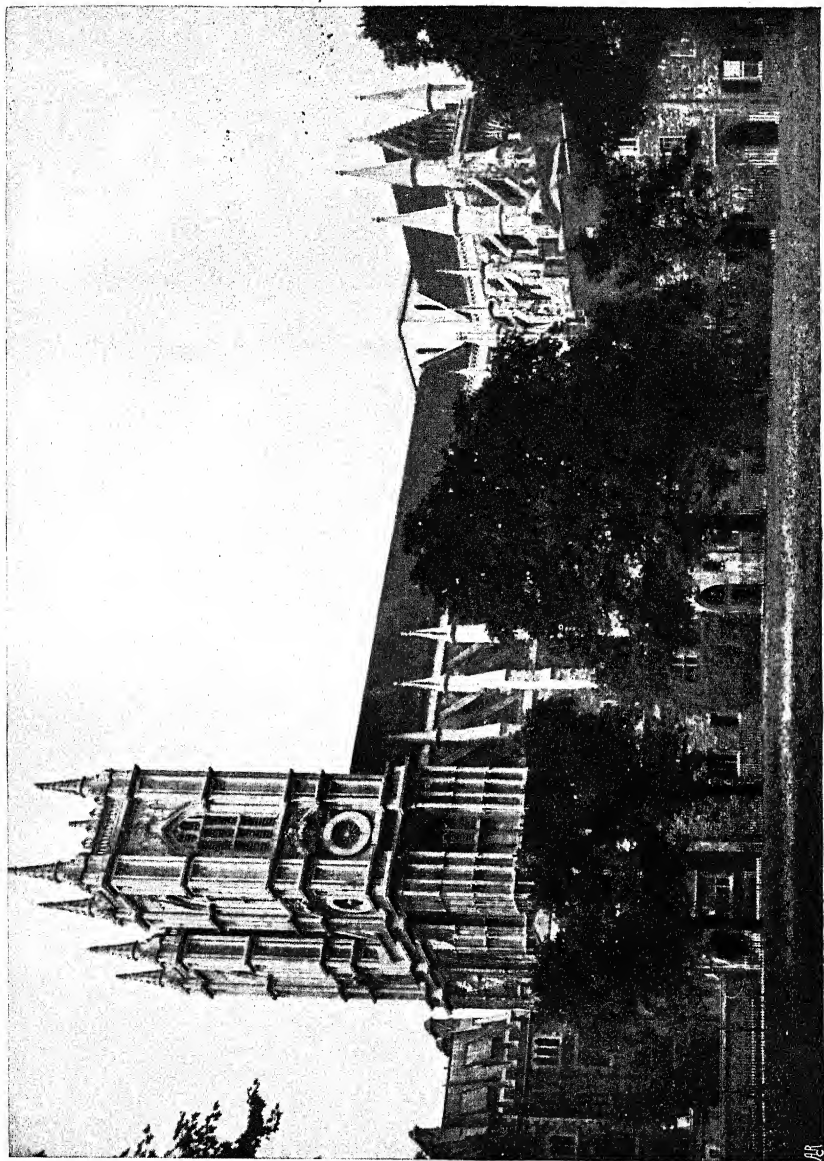
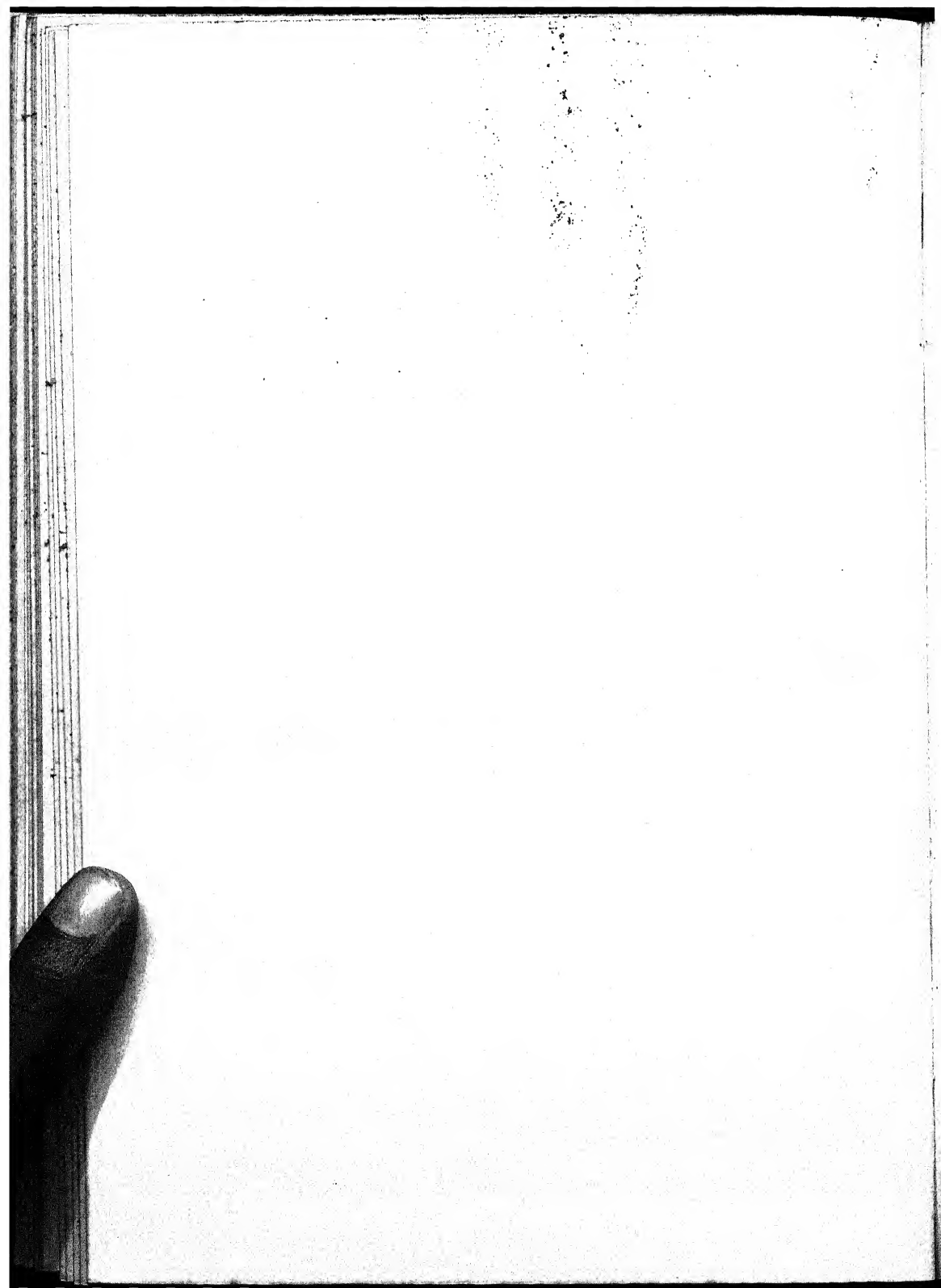


Photo. F. G. O. Stuart

WESTMINSTER ABBEY



'coronation stone' brought away by Edward I. from Scotland is placed beneath the seat of the king's coronation chair. Westminster Abbey is distinguished as the burial-place of numerous English kings from Edward the Confessor to George II.; the north transept is occupied chiefly by monuments to warriors and statesmen; while in the south transept is situated the 'Poet's Corner,' the burial and memorial place of most of England's great writers from Chaucer to Browning and Tennyson. See *London*.

Westminster Assembly of Divines, a celebrated assembly held at Westminster for the settlement of a general creed and form of worship throughout Great Britain. By an ordinance passed 12th June, 1643, 121 clergymen, with ten lords and twenty commoners as lay assessors, were nominated as constituents of the assembly. The assembly began its sittings in July 1643 in Westminster Abbey, but in the meantime a royal proclamation had been issued forbidding the assembly to meet, which had the effect of inducing the greater part of the Episcopal members to absent themselves. The majority of those who remained were Presbyterians, but there was a strong minority of Independents. A deputation was now sent along with commissioners from the English parliament to the General Assembly of the Scottish Church and the Scottish Convention of Estates, soliciting their co-operation in the proceedings of the Westminster Assembly, and accordingly in September four Scottish clergymen, with two laymen, were admitted to seats and votes by an act of the English legislature. The assembly continued to hold its sittings till February 1649. Among the results of its deliberations were the Directory of Public Worship, the Confession of Faith, and the Larger and Shorter Catechisms, which remain practically the standards of the Presbyterians to the present day. At the Restoration the whole proceedings of the Westminster Assembly were annulled as invalid.

Westminster Hall, the hall of the old palace of Westminster, was erected by Richard II. (1397-99) on the foundations of a structure built by William Rufus. It has a fine porch, and its hammer-beam roof of carved timber is considered the most notable of its kind; length of the building, 290 feet, breadth 68 feet, and height 110 feet. This building is closely associated with many stirring events in English history; but it is chiefly remarkable as the

place where were held such great state trials as those of the Chancellor More, Lady Jane Grey, the Earl of Strafford, King Charles I., and Warren Hastings, and as the centre of the highest English courts of law till these were removed to the new buildings recently erected for their accommodation. The hall now serves as a fine vestibule to the Houses of Parliament.

Westminster Review, an English periodical, founded as a quarterly in 1824. Its name was changed in 1835 to the *London Review*, afterwards to the *London and Westminster*. On commencing a new series in 1852 it reverted to its original title. In 1887 it was converted into a monthly. The Westminster has always represented the advanced Radicalism of the day.

Westminster School, or the Royal School of St. Peter's, Westminster, one of the great public schools of England, was founded in 1560, and was reorganized in 1868. There are forty foundationers, the number of vacancies yearly being ten.

Westmorland, a county in England, bounded by Cumberland, Lancashire, Morecambe Bay, Yorkshire, and Durham; area, 505,330 acres, or 790 square miles. The surface, with the exception of a small portion in the south sloping to Morecambe Bay, is very mountainous. The Pennine chain, entering it at Cross Fell on its northern frontier, stretches across it in the north-east, and then curves round, forming the boundary between it and Yorkshire; while the principal chain of the Cumbrian Mountains forms its boundary from Helvellyn (3118 feet) to Bow Fell (2959 feet), and sends a lofty branch nearly across its centre. Much of the celebrated lake-scenery of England is within the limits or on the borders of this county, the chief lakes being Ulleswater, Grasmere, Rydal Water, and Windermere. The principal rivers are the Eden, Lune, and Kent. The minerals include graphite, roofing-slate, marble, and small quantities of coal, lead, and copper. The arable land is mostly confined to the valleys, while the greater part of the remaining surface is in natural pasture, or under wood. Appleby is the county town. Westmorland sends two members to parliament. Pop. 64,303.

Weston-super-Mare (mă're; that is, Weston-on-Sea), a seaport and watering-place in England in the county of Somerset, on the Bristol Channel, 19 miles south-west of Bristol. It is recommended as a place of resort both in winter and summer. A fine

esplanade, pier, and landing-stage have been constructed. Pop. 19,047.

Westphalia, the name given at different periods to (1) one of the circles of the old German Empire, (2) one of Napoleon's kingdoms (1807-13), conferred upon his brother Jerome; and (3) now to a province of Prussia. The latter is bounded by Rhenish Prussia, Holland, Hanover, Brunswick, Hesse, and Nassau. Its area is 7771 square miles. The surface in the south and north-east is generally mountainous; the north-west spreads out into extensive and often marshy plains, and belongs to the basin of the Ems; the north-east and a small part of the east to the basin of the Weser; the remainder, constituting the far larger portion of the whole, belongs to the basin of the Rhine, whose chief tributaries are the Ruhr and Lippe. Besides iron and coal in abundance the minerals include copper, lead, zinc, and salt; and the manufactures are varied and important. The province is divided into the three governments of Münster, Minden, and Arnberg. Münster is the capital. Pop. 3,187,777.

Westphalia, **PEACE OF**, the name given to the peace concluded in 1648 at Münster and Osnabrück, by which an end was put to the Thirty Years' war (which see). By this peace the sovereignty of the members of the empire was acknowledged. The concessions that had been made to the Protestants since the religious peace in 1555 were confirmed. The elector-palatine had the palatinate of the Rhine and the electorate restored to him; Alsace was ceded to France; Sweden received Western Pomerania, Bremen, Verden, Wismar, and a sum equal to £750,000; Brandenburg, Mecklenburg, Hanover, and Brunswick were compensated by the secularization of numerous ecclesiastical foundations. The independence of the United Provinces was recognized by Spain, and that of Switzerland by the empire.

West Point, a village, U. States, state of New York, on right bank of Hudson, about 50 miles from New York city; the seat of the United States military academy, and a favourite summer resort.

Westport, a seaport in Ireland, county of Mayo, at the mouth of a small river in Clew Bay, 10 miles s.s.w. of Castlebar. It is a favourite bathing resort, and has a trade in agricultural produce. Pop. 3892.

West Troy, or **WATERVLIET**, a town of Albany county, New York, on the right bank of the Hudson, opposite Troy, and connected by an iron bridge. Pop. 14,321.

West Virginia. See *Virginia, West*.

Westward-Ho, a sea-bathing place of England, in the county of Devon, on Barnstaple Bay, about 3 miles n.w. of Bideford. Westward-Ho College is a military school, and there is an excellent golfing links.

Wetter, a lake in Sweden, about 24 miles south-east of Lake Wener; greatest length, 80 miles; medium breadth, about 15 miles. Its height above the level of the Baltic is nearly 300 feet, but its depth is in some parts above 400 feet. The Wetter forms part of the canal connection between the Cattegat and the Baltic. The chief town on its shores is Jönköping.

Wetterhorn, a mountain of Switzerland, in the Bernese Oberland, with three peaks respectively 12,149, 12,166, and 12,107 feet high.

Wetzlar, a town in Rhenish Prussia, at the junction of the Lahn and Dill. It was anciently a free imperial town, and was the seat of the imperial German court of justice from 1698 to 1806. Pop. 8906.

Wexford, a maritime county in Ireland, in the province of Leinster, bounded by Wicklow, St. George's Channel, the estuary of the Suir and Barrow, Waterford Harbour, Kilkenny, and Carlow; area, 575,700 acres. The chief inlet on the east coast is Wexford Harbour, which, though spacious, is of intricate navigation and obstructed by a bar. The surface of the interior is hilly, rising into a ridge on the north-west, declining into a level peninsula to the south-east. The chief rivers are the Slaney and Barrow. The prevailing soil is stiff clay, generally well cultivated, and producing oats, wheat, barley, and potatoes. The fisheries are extensive. It returns two members to parliament. Pop. 104,104.—**WEXFORD**, the county town, is a seaport on the river Slaney, where it enters Wexford Harbour. The town has a county court-house, town-hall, prison, theatre, barracks, and a Roman Catholic college. The herring and salmon fisheries employ many persons; malt is manufactured, and distilling, brewing, and ship-building are carried on. The chief trade is in exporting grain, cattle, poultry, butter, &c. Pop. 11,154.

Wexiö (vek'si-eu), a cathedral city of Southern Sweden, with an old cathedral. Pop. 6010.

Weymouth and Melcombe-Regis, a seaport and municipal borough of England (previous to 1885 a parl. borough), in Dorsetshire, on a semicircular bay, 7 miles south-south-west of Dorchester, Weymouth

being on one side, Melcombe-Regis on the other of the small river Wey, over which is a bridge. There is a considerable coasting trade, the chief export being Portland stone. Melcombe-Regis attracts numerous visitors both in summer and winter, owing to its bathing facilities and mild winter climate. There is a large traffic with the Channel Islands. There is a fine esplanade, about 1 mile in length. Pop. 19,843.

Weymouth, a seaport of Mass., U. States, on Boston Harbour. It has manufactures of boots and shoes, &c., and a considerable trade. Pop. 11,324.

Whale, the common name given to the larger mammals of the order Cetacea (which see). They are characterized by having fin-like anterior limbs, the posterior limbs being absent, but having their place supplied by a large horizontal caudal fin or tail. Their abode is in the sea or the great rivers, and they resemble the fishes so closely in external appearance that not only the vulgar, but even some of the earlier zoologists regarded them as belonging to that class. The whales are usually divided into two families, the Balænidæ and the Physeteridæ or Catodontidæ. The Balænidæ, or whalebone whales, are distinguished by the absence of teeth, and by the presence of baleen or whalebone in the mouth. The whalebone whales are divided into two groups—the 'smooth' and the 'furrowed' whales, the latter having a furrowed skin and also a kind of dorsal fin. The typical representative of the whalebone whales is the common Greenland or 'right' whale (*Balæna mysticetus*), so valuable on account of the oil and whalebone which it furnishes. (See *Blubber*, *Whalebone*.) It is principally found in the Arctic seas, but it is also found in considerable numbers in many other parts of the world. Its length is usually about 60 feet, and its greatest girth of body from 30 to 40 feet. The plates of baleen serve to strain out from the water taken into the mouth the pteropoda or other small creatures on which these large animals chiefly subsist. The nostrils open on the top of the head and are known as 'blow-holes'; through these air from the lungs is expired, but water is not ejected in the act of 'blowing' or 'spouting'. Allied to the Greenland whale is the rorqual. It often measures about 100 feet in length, and from 30 to 35 feet in circumference. (See *Rorqual*.) Of the Physeteridæ or Catodontidæ, which have no baleen plates, and are also known as 'toothed

whales', the best-known species is the sperm-whale or cachalot (*Physæter* or *Catodon macrocephalus*), which averages from 50 to 70 feet in length. (See *Sperm-whale*.) Some species of the Delphinidæ or dolphin family are also known as whales. (See *Beluga*, *Caving-whale*.) Whale fishing for the sake of the oil and whalebone was an important industry even in the 12th century. It was for long prosecuted with great energy by the Dutch, English, French, and Americans, but of recent times it has greatly decreased, chiefly on account of the scarcity of whales. The British whaling fleet now numbers only some half-dozen vessels, most or all belonging to Dundee. The American whale fishery is chiefly prosecuted by New Bedford vessels, but is fast dwindling away. The instruments used in the capture of the whale are the harpoon and the lance. The harpoon is an iron weapon about 3 feet in length, terminating in an arrow-shaped head. This is attached to a line, and is thrown at the whale by hand, so as to pierce it, or is discharged from a small swivel cannon placed in a boat. The lance is a spear of iron about 6 feet in length, with a thin sharp steel head. These, with the necessary lines, boats, &c., are all the apparatus required for capturing the whale. When captured the animal is cut up, the blubber boiled and the oil extracted, and the whalebone dried. In 1905 train-oil and sperm-oil to the value of £418,000, and whalebone to the value of £70,000, were imported into Britain.

Whalebone, or **BALEEN**, a well-known elastic horny substance which hangs down in thin parallel plates from the sides of the upper jaw of the family of whales called Balænidæ (see *Whale*). These plates or laminae vary in size from a few inches to 12 feet in length; the breadth of the largest at the thick end, where they are attached to the jaw, is about a foot, and the average thickness is from four to five tenths of an inch. From its flexibility, strength, elasticity, and lightness, whalebone is employed for many special purposes, but it is now rather expensive. In commerce the plates of baleen are often called *whale-fins*.

Whale-fishery. See under *Whale*.

Whale-louse (*Cyamus ceti*, order Læmndipoda), a genus of small crustaceans, so named from living a parasitic life on whales and other cetaceans.

Whampoa, a port of China, on an island of the same name, 12 miles E. of Canton,

with commodious docks, &c., for the cleansing and repair of vessels.

Whang-Hai, the Chinese name for the Yellow Sea (which see).

Wharton, THOMAS WHARTON, MARQUIS OF, born 1640, died 1715, is the reputed author of the celebrated political ballad *Lillibullero*, and was severely castigated by Swift.—His son, PHILIP WHARTON (1699–1731), was created a duke in 1720. Like his father he lived a very profligate life, and is now chiefly remembered as the subject of Pope's satire, as his father was of Swift's.

Whately, RICHARD, Archbishop of Dublin, son of the Rev. Joseph Whately, D.D., of Nonsuch Park, Surrey, prebendary of Bristol, was born in London in 1787, died in 1863. He received his education at a private school at Bristol, and at Oriel College, Oxford. He graduated B.A. in 1808, and in 1810 won the English essay prize. In 1819 he made his first appearance as an author by publishing his famous *Historic Doubts relative to Napoleon Bonaparte*. In 1822 Whately was appointed Bampton lecturer at Oxford, and delivered eight lectures *On the Use and Abuse of Party Feeling in Matters of Religion*. He held the living of Halesworth in Suffolk in 1822–25, and was then appointed principal of St. Alban's Hall, Oxford. In the latter year he published *Essays on Some of the Peculiarities of the Christian Religion*. A second series of essays *On Some Difficulties in the Writings of St. Paul and Other Parts of the New Testament*, came out in 1828; and a third series, *The Errors of Romanism traced to their Origin in Human Nature*, in 1830. In 1827 was published *The Elements of Logic*, and the scarcely less popular *Elements of Rhetoric* in 1828. Both of these works were written originally for the *Encyclopædia Metropolitana*. He occupied the chair of political economy at Oxford in 1830–31, and afterwards published *Introductory Lectures on Political Economy*. In 1831 he was appointed archbishop of Dublin, a position in which he did much for national education and other worthy objects in Ireland, including the foundation and endowment of a chair of political economy in Trinity College. Besides the works already mentioned he wrote or edited many others.

Wheat (*Triticum sativum*), the most important species of grain cultivated in Europe, and a great crop in N. America, India, Argentina, Australia, &c. It grows readily in almost every climate; but its natural home

seems to be a temperate climate, and the soils best adapted for its culture are rich clays and heavy loams. Of cultivated wheats there are many varieties, the differences, however, being mostly due to soil, climate, and mode of cultivation. Three primary varieties may be mentioned: (a) *T. hybernum* (*muticum*), winter or unbearded wheat; (b) *T. aestivum* (*aristatum*), summer or bearded wheat; (c) *T. Spelta* (*adherens*), spelt or German wheat, which is of much less value than the others, but grows on poorer soils and more elevated localities. White wheat and red wheat are names applied according to the colour of the grain, the red sorts being generally harder than the white, but of inferior quality, and the yield is less. Winter wheat is sown in the autumn, with the view of being harvested the following year; summer wheat is sown in the spring of the year in which it is reaped. The best English wheat yields from 75 to 85 per cent of fine flour, the inferior kinds only from 54 to 68 per cent. See *Flour*.

Wheat-ear (*Saxicola emanthe*), a bird of the order Insectores, belonging to the dentirostral section of the order, and to the family of the Sylviadæ or warblers. Its average length is 6½ inches, and its colour gray above, breast brown, and under parts white. The wheat-ear, also known as the *fallow-chat*, is a summer visitant in Britain.

Wheat-eel, a disease in wheat called also *ear-cockle* and *purples*. See *Ear-cockle*.

Wheat-fly, a name common to insects of the genus *Cecidomyia*, applied especially in England to *C. tritici*, sometimes also called the *wheat-midge*. It is a two-winged gnat about the tenth of an inch long, and appears about the end of June. The females lay their eggs in clusters among the chaffy flowers of the wheat, where they produce little footless maggots, whose ravages destroy the flowers of the plant, and render it shrivelled and worthless. The American wheat-fly (*C. destructor*) is described and figured under *Hessian-fly*.

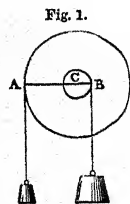
Wheatstone, SIR CHARLES, scientific investigator and discoverer, born at Gloucester in 1802, died at Paris in 1875. Before he was of age he commenced business for himself in London as a maker of musical instruments, and in 1823 attracted the attention of men of science by the publication in Thomson's *Annals of Philosophy* of a paper entitled *New Experiments on Sound*. This was followed by a number of other papers, some of them describing inventions of his own, all of which are remarkable for his ingenuity

and delicacy of mechanical construction. In 1834 Wheatstone was appointed professor of experimental philosophy in King's College, London, but he seldom lectured. In 1836 he exhibited at King's College experiments showing the velocity of electricity, which suggested to him the idea of applying his apparatus to telegraphing, and in 1837, in conjunction with W. F. Cooke, he took out the first patent for the electric telegraph. He was a fellow of the Royal Society from the year 1836, and in 1868 he received the honour of knighthood. He was the author of numerous papers, chiefly contributed to the *Philosophical Magazine* and the *Journal of the Royal Institution*.

Wheel, an instrument of torture formerly employed in France and Germany, on which the criminal was placed with his face upwards, and his legs and arms extended along the spokes. On the wheel being moved round the executioner broke the wretch's limbs by successive blows with a hammer or iron bar, and after a more or less protracted interval put an end to the sufferings of his victim by two or three severe blows, called *coups de grâce* (mercy strokes), on the chest or stomach, or by strangling him. In Germany its use lingered down till the beginning of the present century.

Wheel, PERSIAN. See *Persian Wheel*.

Wheel and Axle, one of the mechanical powers, which consists of a wheel round the



Wheel and Axle.

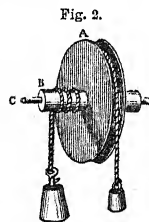


Fig. 2.

circumference of which a string may be wound, having a small weight attached to its free end, and an axle whose circumference, being smaller than that of the wheel, will sustain a heavier weight at the end of a string which is wound upon it in the opposite direction to that of the string on the wheel. The wheel and axle is merely a case of the lever, *C* in the figs. being the fulcrum, while *AC* and *BC*, the radius of the wheel and axle respectively, are the longer and shorter arms of the lever. Hence the

small weight in ounces or other measure of weight multiplied by the radius of the wheel is equal to the balancing weight on the axle multiplied by the radius of the axle. In a great many cases a crank takes the place of the wheel, the circle described by the handle corresponding to the circumference of the wheel. The common winch, the windlass, the capstan, and the tread-mill are so many applications of the wheel and axle; and the same principle may be adapted to a train of wheel-work wherein motion is regulated and power acquired.

Wheel-animal, WHEEL-ANIMALCULE. See *Rotifera*.

Wheeling, a city and port of the United States, in West Virginia, capital of Ohio county, on the east or left bank of the Ohio River, 92 miles below Pittsburg. It is the most important place on the river between Pittsburg and Cincinnati, and in respect to trade, manufactures, and population the most considerable town of the state. Coal is largely worked in the neighbourhood; there are iron-foundries and forges; nail, glass, and paper works; cotton, silk, and steam-engine manufactories; and a brisk traffic by river and railroad. Pop. 38,878.

Wheel-window, in Gothic architecture, a circular window with radiating mullions resembling the spokes of a wheel. See *Rose-window*.

Whelk, a general name applied to various species of gasteropodous molluscs. The large or common whelk (*Buccinum undatum*) is found on the coast of Great Britain, and is distinguished by the shell having its canal notched, and the mouth or aperture of large size. The whelks are typically carnivorous molluscs, and possess long *odontophores* or tongues provided with siliceous or flinty teeth. These animals are largely used for food and bait.

Wherry, a light, shallow boat, seated for passengers, and plying on rivers.

Whetstone. See *Hone*.

Whewell (hū'el), WILLIAM, an English philosopher, was born at Lancaster in 1794, and received his early education at the free grammar-school of his native town, afterwards at Haversham Grammar-school, whence he went to Trinity College, Cambridge. Here he graduated B.A. in 1816, as second wrangler and second Smith's prizeman. In due course he became fellow and tutor of his college. In 1828 he was elected professor of mineralogy. In 1832 he resigned this chair for that of moral philosophy,

which he held till 1855, when he became vice-chancellor of the university. In 1841 he was nominated to the mastership of Trinity, and in this position laboured earnestly and successfully to obtain for the natural and moral sciences a better recognized position among the studies of the university. He became fellow of the Royal Society in 1820, and was one of the first members of the British Association, of which he was president in 1841. He died in 1866. Among Whewell's multifarious writings may be mentioned the *Bridgewater treatise*, *Astronomy and General Physics*, considered with reference to Natural Theology (1833); *History of the Inductive Sciences* (1837); *Philosophy of the Inductive Sciences* (1840); *History of Scientific Ideas*; *Elements of Morality*, including *Polity* (1845); *On Liberal Education in General*; *Lectures on the History of Moral Philosophy in England* (1852); *Platonic Dialogues* (1859-61); *Lectures on Political Economy* (1863).

Whey. See *Milk*.

Whidah-bird, a name given to weaver-birds of the genus *Vidua*, inhabiting Western Africa, and found in abundance in the kingdom of Dahomey, near *Whidah*. In size the Whidah-bird resembles a linnet or canary, and during the breeding season the male is supplied with long, drooping tail-feathers, giving it a graceful appearance.

Whig, in English history, the name which was from the time of Charles II. to within little more than a generation ago applied to the political party that advocates such changes in the constitution as tend in the direction of democracy. The term is of Scottish origin, and various explanations of it are given. It was originally applied to the Covenanters of the south-west of Scotland. From Scotland the word was brought to England, where it was used as the distinguishing appellation of the political party opposed to the *Tories*. The term *Liberals* is now generally applied to the representatives of the party formerly known as Whigs; while the extreme section of the party may be said to have dropped all connection with the Whigs, and to have adopted the name of Radicals. See *Tory*.

Whimbrel. See *Curlew*.

Whin. See *Furze*.

Whin-chat, a passerine bird of the genus *Saxicola* or *Pratincola*, the *S. or P. rubetra*. It is common in the British islands during summer, frequenting broom and furze, on the highest twigs of which it perches, and

occasionally sings very sweetly. It is closely allied to the stone-chat (which see).

Whipping, a punishment inflicted by the law of England chiefly for minor offences. The criminal law consolidation acts (24 and 25 Vict. cap. xcvi.-c. 1861) enumerate several offences for which the punishment may be inflicted on males under sixteen. A subsequent act enacts that when the offender is under fourteen the number of strokes is not to exceed twelve. Act 26 and 27 Vict. cap. xlv. enacts that, in all cases of robbery or intent to rob, where the attempt is accompanied by personal violence, the court may, in addition to the other punishments provided by the laws, direct that the offender, if a male, be once, twice, or thrice privately whipped. This law was chiefly aimed at the practice of garrotting (see *Garrote*). In Scotland no person above sixteen is to be whipped for theft or crime committed against person or property. By 1 Geo. IV. cap. lvii. it is enacted that no female shall be whipped. See also *Flagellants*.

Whip-poor-Will, the popular name of an American bird, the *Chordeiles*, *Antrostomus*, or *Caprimulgus vociferus*, allied to the European goat-sucker or night-jar, and so called from its cry. It is very common in the eastern parts of the United States; is about 10 inches long, and feeds on flying moths and other insects. Its note is heard in the evening, or early in the morning. During the day these birds retire into the darkest woods.

Whirlpool, a circular eddy or current in a river or the sea produced by the configuration of the channel, by meeting currents, by winds meeting tides, &c., as those of Charrybdis, the Maelstrom, and Corryvreckan.

Whirlwig, WHIRLWIG-BEETLE (*Gyrinus natator*), a beetle which abounds in fresh water in Britain, and may be seen circling round on its surface with great rapidity. Its eyes are divided by a narrow band, so that, although it has only two, it is made to look as if it had four.

Whirlwind, a violent wind moving in a spiral form, as if moving round an axis, this axis having at the same time a progressive motion. Whirlwinds are produced chiefly by the meeting of currents of air which run in different directions. When they occur on land they give a whirling motion to dust, sand, &c., and sometimes even to bodies of great weight and bulk, carrying them either upwards or downwards, and scattering them

about in all directions. At sea they often give rise to water-spouts. They are most frequent and violent in tropical countries.

Whisky (a corruption of the Gaelic word *uisge*, water, whisky being called in Gaelic *uisge-beatha*, which signifies *water of life*), the name applied to an ardent spirit distilled from barley, maize, wheat, rye, rice, sugar, molasses, &c. There are two chief varieties of whisky—viz. malt-whisky and grain-whisky. The former variety is often held to be of finer quality, and is made chiefly from malted barley or bere. The latter is made principally from unmalted grain, as maize, barley, oats, &c., dried and ground up. In either case a kind of beer is first brewed from the fermented materials, and the whisky is got from that by distilling. Grain-whisky requires much the same process of fermentation and distillation as malt-whisky, but is cheaper, the yield being greater, and the expensive process of malting being saved. Both kinds are harsh or coarse until mellowed by age. See *Distillation, Brewing, Malt, Alcohol*.

Whist, a well-known game at cards, first clearly described by Edmond Hoyle in his *Short Treatise on the Game of Whist* (1743). The game is played with the full pack of fifty-two cards by four persons, two being partners against the other two, each player receiving thirteen cards dealt out one by one in rotation. The last card dealt is turned face up, and is called the trump card; it gives a special power to the suit to which it belongs. The cards rank as follows: ace (highest), king, queen, knave, and the others according to their number of pips. Play is commenced by the person on the left hand of the dealer laying down a card face up on the table, the other players following in succession with cards of the same suit if they have them. When all have played the player who has laid the highest card takes the four cards laid down, which constitute a trick. The winner of the trick then leads, as the first of a new trick, the winner of which becomes the leader, and so on. When a player cannot play a card of the same suit, he may play one of the trump suit, and take the trick, or lay one of a different suit, which gives him no chance of winning the trick. When the hand is played out the score is taken as follows: the partners who conjointly gain the majority of tricks score one point for every trick taken above six. The ace, king, queen, and knave of the trump suit are called honours, and count one

each for the side who holds them; if one side hold three honours, they count two by honours, as the opposite side can have but one; if one side hold all the honours, four by honours is counted; should the honours be equally divided neither side counts, the honours being then said to cancel each other. In *long whist*, an obsolescent form of the game, ten of these points made a game. In *short whist*, the game now generally played, the number has been reduced to five, and in this form it is common to count by tricks alone. A rubber consists of a series of three games, and is won by the side that secures two of them. Should one party gain two games in succession, the third of the rubber is not played.

Whiston, WILLIAM, an English divine and mathematician, born in 1667, died 1752. He studied at Clare Hall, Cambridge, where, having taken his degree in 1690, he was chosen a fellow of his college, and became an academical tutor. Entering into holy orders he was appointed in 1694 chaplain to the Bishop of Norwich. In 1696 he published a *Theory of the Earth* on the principles of the Newtonian philosophy; in 1698 became rector of Lowestoft; and in 1701 was appointed deputy-professor of mathematics at Cambridge by Sir Isaac Newton, who shortly afterwards resigned the professorship in his favour. He was expelled from the university in 1710 for Arian opinions, and the following year was deprived of his professorship. He then removed to the metropolis, and published his *Primitive Christianity*, which caused him to be prosecuted as a heretic, though the proceedings were ultimately terminated by an act of grace (1715). Towards the close of his life he became a Baptist. Among his latest labours were his *Memoirs of My own Life* (1749-50). Besides numerous original productions he published a well-known translation of the works of Josephus.

Whitby, a seaport and watering-place of England, in the North Riding of Yorkshire, at the mouth of the Esk, which divides it into two nearly equal parts, and is spanned by a stone bridge with a movable centre-portion for admitting vessels into the inner harbour. The town is situated on bold acclivities, and has the ruins of an ancient cruciform church, on the verge of a lofty cliff. Jet ornaments are made, jet being found here; and the fisheries are important. Pop. 11,755. Whitby gives name to a parl. div. of the county.

White, REV. GILBERT, naturalist, born in 1720 at Selborne in Hampshire, died 1793. He was educated at Oriel College, Oxford, of which he became a fellow in 1744. He declined all church preferment, but in his latter years served as curate in his native village, in the beautiful rural scenery of which he spent the greater part of his days, occupying his leisure hours mainly with the study of natural history, in which he was a most assiduous and accurate observer. His *Natural History of Selborne* was published in 1789, and has retained a deserved and unimpaired popularity to the present day. Mr. White was also the author of letters on the antiquities of Selborne.

White, HENRY KIRKE, a minor poet, born at Nottingham in 1735. He was the son of a butcher, but being of a delicate constitution he was put to the trade of stocking-weaving. From his infancy he manifested great love of learning, and at the age of fourteen produced some notable specimens of poetry. He was now taken from the loom and placed in an attorney's office; but his ambition was for the church, and through the exertions of friends he was admitted a student of St. John's College, Cambridge. There he applied himself to his studies with such unremitting labour, that his health became deranged, and he died in 1806. He published, in 1803, a poem called *Clifton Grove*; and after his death his *Remains*, consisting of poems, letters, &c., were edited by Southey.

White-ants. See *Termites*.

White-bait, a name for the young of the herring, long regarded as a distinct fish, or as the fry of the shad. It abounds in the Thames during spring and summer, and is much prized by the Londoners. It has a length of 2 to 5 inches, is pale silvery in colour with a greenish hue on the back. It is not peculiar to the Thames, but occurs in the Clyde, Forth, and elsewhere. It used to be a common custom for the members of the English cabinet to assemble at Greenwich previous to the prorogation of parliament in autumn to partake of a white-bait dinner.

White-bay, a tree of the genus *Magnolia*, the *M. glauca*. It grows in wet ground in the United States. The bark and seed-cones are used as tonics.

White-beam. See *Beam-tree*.

White-bear. See *Bear*.

Whiteboys, an illegal association formed in Ireland about 1760. The association

consisted of starving day-labourers, evicted farmers, and others in a like condition, who used to assemble at nights to destroy the property of harsh landlords or their agents, the Protestant clergy, the tithe collectors, or any others that had made themselves obnoxious in the locality. In many cases they did not confine their acts of aggression merely to plunder and destruction, but even went the length of murder.

Whitefield, GEORGE, founder of the Calvinistic Methodists, was born in 1714 at Gloucester. At the age of eighteen he entered as servitor at Pembroke College, Oxford, where he became acquainted with the Wesleys, and joined the small society which procured them the name of Methodists. (See *Methodists* and *Wesley*.) He was ordained deacon in 1736, and soon became very popular as a preacher. In 1738 he went to the American settlement of Georgia, where his ministrations gave great satisfaction to the colonists. In the following year he returned to England to procure subscriptions for building an orphan-house in the settlement. Having taken priests' orders, he repaired to London, where the churches in which he preached proved incapable of holding the crowds who assembled to hear him. He now adopted preaching in the open air, and visited various parts of the country, addressing vast audiences. In 1739 he again embarked for America, and made a tour through several of the provinces, preaching with great effect to immense crowds. He returned to England in the following year, where for a time differences between him and Wesley deprived him of many followers. After visiting many parts of England, Scotland, and Wales he again returned to America, and remained there nearly four years. Soon after his return he was introduced to the Countess of Huntingdon, who made him one of her chaplains. A visit to Ireland and two more voyages to America followed, and for several years his labours were unremitting. At length, on his seventh visit to America, he died at Newburyport, Mass., 1770.

Whitehall, a locality in Westminster, where are the Admiralty office, the Horse Guards, and other important government offices. (See *London*.) On the bank of the Thames was a palace called Whitehall, built before the middle of the 13th century. In 1530 it became the residence of the court, but in 1697 was destroyed by fire, excepting the Banqueting Hall, added by James I.,

from a design of Inigo Jones, in 1619. Charles I. was executed in front of Whitehall, and Cromwell died here. The Banqueting Hall is now the United Service Museum.

Whitehaven, a parl. and mun. borough and seaport of England, in Cumberland, situated on a bay of the Irish Sea, has a custom-house, market-house, good harbour and dock, and enjoys a considerable shipping trade. The principal exports are coal, pig-iron, rails, and hematite iron ore. Iron ship-building is carried on, and there are blast-furnaces and iron and brass foundries. The coal and iron mines in the neighbourhood employ a large number of the inhabitants. Whitehaven returns one member to parliament. Pop. (mun. bor.), 19,324.

White-lead. See *Ceruse*.

White Mountains, a group in the north-east of the United States, in New Hampshire, belonging to the Alleghanies. They have fine scenery and are a favourite summer resort. The culminating point is Mount Washington, 6288 feet.

White-oak, a species of oak, the *Quercus alba*, a native of the United States of America and of parts of Canada.

White-pine, the *Pinus Strobus*, one of the most valuable and interesting species of pines, common to Canada and the northern parts of the United States. See *Pine*.

White-poplar, the *Populus alba*. See *Poplar*.

White River, (1) a river of Arkansas, U.S., with a course of 800 miles. It joins the Mississippi above the influx of the Arkansas river, and has several important affluents. Together with its tributaries it affords 500 miles of boat navigation. (2) A river in Indiana, formed by the confluence of the East and West Forks, emptying into the Wabash near Mount Carmel.

White Sea, a large gulf of the Arctic Ocean, penetrating into Northern Russia to the distance of between 300 and 400 miles. It has an area of about 47,000 square miles, with a coast-line of 1000 miles. It is navigable only from the middle of May to the end of September, being frozen over the rest of the year. About thirty rivers, among which the principal are the Northern Dwina, the Onega, and the Mezene, empty themselves into the sea. At the mouth of the Dwina lies Archangel, the commercial emporium of this region. Two canals, uniting the Dwina with the Volga and the Dnieper, connect the White Sea with the Caspian and Black Seas.

White-swelling, the popular name for all severe diseases of the joints, resulting from chronic inflammation in the bones, cartilages, or membranes constituting the joint. Among the diseases known under this name are: (a) acute or chronic inflammation of the synovial membrane; (b) pulpy thickening of the synovial membrane; (c) ulceration of the cartilages; (d) scrofulous diseases of the joints beginning in the bones. They may arise as effects of phlebitis, gout, rheumatism, syphilis, scrofula, or mercury. The knee, ankle, wrist, and elbow are the joints most subject to white-swellings.

White-thorn. See *Hawthorn*.

White-throat, a small singing bird of the family of warblers. The common white-throat (*Sylvia undata*) attains a length of 5 inches, frequents gardens and hedges, and is a regular summer visitor to the British Islands. The lesser white-throat (*Sylvia curruca*) is also a summer visitor to Britain.

White Vitriol, sulphate of zinc. See *Zinc*.

Whitewash, a composition of lime and water, or of whiting, size, and water, used for whitening walls, ceilings, &c.

White Whale. See *Beluga*.

Whitgift, JOHN, Archbishop of Canterbury, was born at Grimsby in 1530, and completed his education at Cambridge under Ridley and Bradford. He imbibed from his uncle, Abbot Whitgift, opinions that inclined him later to the side of the Reformation; but by a cautious reserve he escaped persecution during the reign of Queen Mary, and on the accession of Elizabeth was ordained priest. He held successively many posts at Cambridge, including the mastership of Pembroke Hall and Trinity College, and the regius professorship of divinity. In 1577 he was appointed bishop of Worcester, and on the death of Grindal (1583) was raised to the primacy. He had always been a rigid disciplinarian; but he now became an inquisitor, insisted on new articles of subscription, suspended the clergy who refused them, and in every way acted as the intolerant ecclesiastic. He took a leading part in the conference at Hampton Court under James I., and died soon after, in 1604.

Whiting (*Merlangus vulgaris*), a well-known fish belonging to the cod tribe. It abounds on all the British coasts, and in the seas of Northern Europe generally, and exceeds all the other fishes of its tribe in its delicacy and lightness as an article of food. It does not usually exceed 1½ lb. in weight.

Whiting, a name for chalk, cleared of its grosser impurities, and employed as a whitewash and as a polishing powder for brass, silver, &c.

Whiting-pout, a British fish of the cod family (*Morrhua lusca*). See *Bib*.

Whitlow, in surgery, is an inflammation affecting the skin, tendons, or one or more of the bones of the fingers, and generally terminating in an abscess. There is a similar disorder which attacks the toes. Whitlows differ very much in their degree of violence and in their depth and extent. The usual exciting causes of whitlows are various external injuries, as pricks, contusions, &c. The lodgment of a thorn or splinter in the part is another frequent cause. They are much more common in young, healthy persons than in others, and in many cases occur without any assignable cause.

Whitman, WALT, an American poet, born in Long Island, in the state of New York, in 1819. In his early days he worked at the carpentry trade and at printing. Subsequently he became a school teacher, and wrote for the press. During the civil war Whitman devoted himself to the care of the wounded in the hospitals of Virginia and Washington, and at the end of the war came out with his constitution irretrievably broken. He subsequently entered the government service in the capital, remaining there till 1874. He then removed to Camden, N. J., where he died in 1892. In 1887 his English admirers raised a subscription in his behalf. His poems are like nothing else in the language, rough, rude, chaotic even, but strongly individual. The best known are: *Leaves of Grass*, *Drum Taps*, and *Democratic Vistas*. *Specimen Days and Collect*, and *November Boughs*, contain his prose writings, old and new; though it is difficult in the case of Whitman to distinguish prose from poetry in the ordinary senses of the terms.

Whitney, ELI, American inventor, born at Westborough, Mass., in 1765, and educated at Yale College, where he graduated in 1792. Going then to Georgia as a teacher, he there invented a machine for separating the cotton from the seed. Returning to the north he started business in conjunction with a man named Miller as a manufacturer of cotton gins. But the profits of the business, together with 50,000 dollars voted to him by the state of South Carolina, were swallowed up in his lawsuits in defence of his rights. He subsequently went into the

manufacture of firearms, for which he received a government contract, and so made a fortune. He died in 1825.

Whitney, WILLIAM DWIGHT, a distinguished American philologist, born in 1827 at Northampton, Mass., studied at Williams' College, Williamstown, and at Yale College, giving special attention to Sanskrit. He also studied Sanskrit in Germany from 1850 to 1853, returning in the latter year to America. The first-fruits of his studies in Sanskrit was an edition of the *Atharva-Veda* in conjunction with Roth (1856). He had previously (1854) been made professor of Sanskrit and of comparative philology at Yale College. Among his independent works may be mentioned, *Language and the Study of Language* (1867), *Oriental and Linguistic Studies* (1872-74), *Life and Growth of Language* (1875), *Sanskrit Grammar* (a highly important work), *German Grammar*, &c. He was chief editor of the *Century Dictionary of the English Language* published in America. He died in 1894.

Whitstable, a seaport of England, county of Kent, 6 miles by rail W.N.W. of Canterbury, of which it is the port. It has extensive oyster fisheries. Pop. 7086.

Whitsuntide. See *Pentecost*.

Whittier, JOHN GREENLEAF, American poet, was born of Quaker parents in 1807 at Haverhill, Mass., and educated at the academy of his native place. In his younger days he worked on his father's farm and learned the shoemaking trade, but early began to write for the press, and in 1831 published his first work, *Legends of New England* in prose and verse. He carried on the farm himself for five years, and in 1835-36 he was a member of the Legislature of Massachusetts. After having edited several other papers he went to Philadelphia to edit the *Pennsylvania Freeman*, an anti-slavery paper, the office of which was burned by the mob in 1839. In the following year he returned to his native state, settling at Amesbury, where (or at Danvers, Mass.) he afterwards chiefly resided. Among the numerous volumes of poetry which he from time to time gave to the world the following may be mentioned: *Moll Pitcher*, *Lays of my Home*, *Miscellaneous Poems*, *The Voices of Freedom*, *Songs of Labor*, *The Chapel of the Hermits*, *Home Ballads and Poems*, *Snow Bound*, *In War-time*, *National Lyrics*, *Ballads of New England*, *Miriam*, *Mabel Martin*, *Hazel Blossoms*, *The King's Missive*, *Poems of Nature*, *St.*

Gregory's Guest, &c. Whittier's poems are distinguished by their freshness, their quiet power, and intense feeling. He died in 1892.

Whittlesey, an old town of England, in the county of Cambridge, 6 miles east by south of Peterborough. Pop. 3909. The shallow lake, Whittlesey Mere, 4 miles south-west of the town, after being drained and the land reclaimed, is again forming.

Whitworth, a town of England, Lancashire, 2 miles N.W. of Rochdale, with cotton factories, coal-mines, and quarries. Pop. 9578.

Whitworth, SIR JOSEPH, English engineer, was born in 1803, and died in 1887. After working as a journeyman in Manchester and London, he started business in the former city in 1833 as a manufacturer of engineers' tools, thus founding the large firm of which he was long the head. He was known for a system of screw-threads, and also for his standard gauges. In 1854-55 he began his experiments with firearms, which led to the production of the Whitworth gun, and later brought him into competition with Armstrong as a manufacturer of rifled ordnance. He was also the originator of the fluid-pressed steel, used in the manufacture of cannon and ships' plates. He was F.R.S., LL.D. of Edinburgh, and D.C.L. of Oxford. He was created a baronet in 1869. The Whitworth scholarships (which see) were founded by him in 1869. He is the author of *Guns and Steel* (1873).

Whitworth Scholarships, certain scholarships established in 1869 by Sir Joseph Whitworth, to encourage the cultivation of combined theoretical and practical skill in the industrial arts of mechanics and engineering. They were placed by the founder under the charge of the English council of education, and are open to be competed for by any young man not twenty-six years complete, and who has been engaged in handicraft in the workshop of a mechanical engineer for at least three years. There are now four scholarships annually competed for of the value of £125, tenable for three years, besides exhibitions tenable for one year, value £50 and £100.

Whooping-cough. See *Hooping-cough*.

Whorl, in botany, a ring of organs all on the same plane.

Whortleberry (*Vaccinium*), a genus of shrubby plants, the type of the natural order Vacciniaceæ, with alternate leaves, pink or red bell-like flowers, and berries of a dark purple, bluish, or red colour. The common whortleberry, bilberry, or blaeberry (*V. myr-*

tillus) is a hardy plant, which grows in forests, heaths, and on elevated mountains. In some of the pine forests of Scotland the plant attains the height of 3 feet. The berries have a pleasant, sweet taste, and are used for making jelly. The berries of the red whortleberry (*V. vitis-idaea*) are of a bright red colour, and possess acid and astringent properties; from their similarity to cranberries they are sold as such in various parts of Scotland. (See *Cranberry*.) Whortleberries in N. America are generally known as huckleberries.

Whydah, a town of West Africa in the French colony of Dahomey, on the Bight of Benin. Pop. about 12,000.

Whydah-bird. See *Whidah-bird*.

Whyte-Melville, GEORGE JOHN, novelist, born in Fifeshire in 1821. He entered the army, and fought in the Crimean war. He first made himself known as a novelist in 1853, when he published *Digby Grand*. This was followed by *General Bounce*, *Kate Coventry*, *Market Harborough*, *The Gladiators*, *Sarchedon*, *Satanella*, *Holmby House*, *Bones and I*, &c. He was killed in the hunting-field in 1878.

Wiborg. See *Viborg*.

Wich'ita, a city in the state of Kansas, U.S., situated on the east bank of the Arkansas River. It is the most important railway centre in the state, being the junction of seven different lines. Wichita has sprung into existence since 1870. Pop. 24,671.

Wick, a royal, municipal, and parliamentary burgh and seaport of Scotland, capital of the county of Caithness, at the head of the Bay of Wick, on the left bank of the river Wick, over which is a bridge connecting it with its suburb Pulteney-Town. The staple employment is the herring fishing. Along with Cromarty, Dingwall, Dornoch, Kirkwall, and Tain, it sends a member to parliament. Pop. 7911.

Wickliffe, WYCLIFFE, WICLIFF, WYKLYF, &c., JOHN, was born about 1320 at Hipswell, near Richmond; in Yorkshire. He was educated at Oxford; was elected master of Balliol College, and in 1361 was appointed rector of Fylingham, or Fillingham, in Lincolnshire. He afterwards became doctor of theology and teacher of divinity in the university; and for some time held the living of Ludgershall, in Buckinghamshire. Disputes existed at this period between Edward III. and the papal court relative to the homage and tribute exacted from King John, and the English parliament had resolved to

support the sovereign in his refusal to submit to the vassalage. Wickliffe came forward on behalf of the patriotic view and wrote several tracts, which procured him the patronage of John of Gaunt, duke of Lancaster. In 1374 he was one of the commissioners sent by the king to Bruges to



John Wickliffe.

confer with the nuncio of Gregory XI. respecting the statutes of provisors and præmunire. Shortly before, Edward gave him the valuable rectory of Lutterworth, in Leicestershire, which he held till his death. Here he laboured zealously and unweariedly as a preacher and pastor, though he lived at times also in Oxford or London. In some of his utterances he is said to have styled the pope Antichrist, charging him with simony, covetousness, ambition, and tyranny. His opinions began to spread, and the church grew alarmed. Courtenay, bishop of London, summoned him to appear before a convocation at St. Paul's. Wickliffe appeared there on 19th February, 1377, attended by his friends, John of Gaunt (then the virtual ruler of England), Lord Percy, the earl-marshal, and others. Hot words passed between the bishop and the duke; blows followed; and the meeting broke up in confusion. In May following the pope addressed three bulls to the king, the primate, and the University of Oxford, commanding them to take proceedings against Wickliffe, who in answer to the prelate's summons appeared in the chapel of Lambeth. Proceedings were, however, stopped by order of the queen-mother, and Wickliffe was dismissed with simply an injunction to

refrain from preaching the obnoxious doctrines. About this time he was engaged in translating the Bible from the Vulgate with the assistance of some of his friends. In 1381 he publicly challenged the doctrine of transubstantiation, and his heresies were condemned by the theologians of Oxford, as well as by a provincial council called by Archbishop Courtenay and held at the Blackfriars, London, in 1382. Wickliffe was proclaimed a heretic, his works were condemned to be burned, and some of his followers were imprisoned; but he was allowed to retire unmolested to his rectory of Lutterworth. A stroke of paralysis terminated his life on the 31st of December, 1384. About thirty years after his death his doctrines were condemned by the Council of Constance, and in 1428 his remains were dug up, burned, and the ashes cast into the Swift. The influence of his doctrines spread widely on the Continent, and may easily be traced in the history of the Reformation. Wickliffe was the author of an enormous number of writings in Latin and English, and he ranks undoubtedly as the father of English prose. Many of his writings still remain in MS., and it was not until 1850 that the whole of his Bible appeared.

Wicklow, a maritime county of Ireland, in the province of Leinster, bounded by the county of Dublin, St. George's Channel, Wexford, Carlow, and Kildare; greatest length, 40 miles; breadth, 33 miles; area, 500,178 acres. The coast is mostly precipitous, and dangerous from sand-banks. The surface is diversified and picturesque, rising into mountain-groups, the loftiest of which is Lugnaquilla, 3039 feet high, and intersected by deep and romantic valleys. Its minerals include a little gold in the streams, lead and copper ores, and pyrites in considerable quantities. The principal rivers are the Slaney, Vartrey, and Avoca. The principal agricultural products are oats, potatoes, wheat, and cattle. Wicklow returns two members to parliament. Its chief towns are Bray, Arklow, Wicklow, and Balinglass. Pop. 60,824.—WICKLOW, the county town, is situated on a creek, which forms a shallow natural harbour capable of being vastly improved. Pop. 3288.

Widdin, or VIDIN, a town of Bulgaria, on the right bank of the Danube. Ships can reach the town at high-water, and there is a considerable trade, chiefly in corn, wine, and salt. Widdin was formerly strongly fortified. Pop. 15,000.

Widgeon, or **WIGEON**, a species of natorial bird allied to the Anatidae or ducks; the *Marëca penelope*. It breeds occasionally in the most northern parts of Scotland, but the ordinary breeding-place is in more northern regions. They are numerous in the British islands during the winter, and are in request for the table. The American widgeon is the *Marëca americana*. It is most abundant in Carolina, and is often called *bald-pate*, from the white on the top of the head.

Widnes, a mun. borough of England, Lancashire, on the Mersey (here crossed by a 'transporter' bridge to Runcorn and a railway bridge), giving name to a parl. div. There are extensive chemical works; copper-smelting works, rolling-mills, iron-foundries, &c. Pop. 28,580.

Widow-bird. See *Whidah-bird*.

Wieland (vē'lānt), CHRISTOPH MARTIN, German romancist and poet, born in 1733; died in 1813. He was educated at the University of Tübingen; was appointed professor of philosophy in 1769 at Erfurt; and three years afterwards went to Weimar as teacher to the sons of Duchess Anna Amalie. Here, or in the immediate neighbourhood, he resided till his death, being a member of the circle to which Goethe, Schiller, and Herder belonged. The early period of his literary life was devoted to pietistic or at least serious poetry such as *The Nature of Things* (1752), *Twelve Moral Letters in Verse*, *Anti-Ovid* (1752), *The Trial of Abraham's Faith* (1753); in the second period he produced the romances *Agathon* (1766), and *Don Sylvio de Rosalva* (1764), the poem *Musarion* (1768), and a prose translation of *Shakspeare* in eight vols. (1762-66); while in the third and ripest period were written the romantic epic of *Oberon* (1781), *History of the Abderites* (1781; *The Republic of Fools*, London 1861); *The Secret History of Peregrinus Proteus* (1791), &c. He also published translations of Horace, Lucian, and the *Letters of Cicero*.

Wieliczka (vyel-ich'ka), a town in Austria, Galicia, situated 8 miles south-east of Cracow, and noted for its extensive salt-mines. Pop. 6300.

Wiener-Neustadt (vē'nēr-noi'stāt), a town of Austria, 25 miles s. of Vienna. It was almost entirely destroyed by fire in 1834, but a number of interesting mediæval buildings yet remain. There are important manufactures of locomotives, machinery, pottery, leather, &c. Pop. 28,438.

Wiesbaden (vēs'bā-dén), a town in Prussia, province of Hesse-Nassau, finely situated at the foot of Mt. Taunus, in the valley of the Salzbach, about 2 miles from the Rhine. It is noted for its hot medicinal saline springs (the temperature of the Kochbrunnen being 156° F.), and it attracts annually upwards of 100,000 visitors. The chief buildings are the Kursaal, a new town-house, an old and a new palace, library, museum, English church, and other churches, theatre, &c. Pop. 100,953.

Wife. See *Husband and Wife*.

Wig, an artificial covering of hair for the head, used generally to conceal baldness, but formerly worn as a fashionable means of decoration. Formally curled wigs are still worn professionally by judges and lawyers in Great Britain, and wigs are commonly used in making up for the stage.

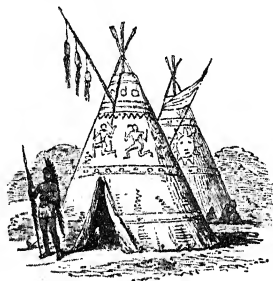
Wigan, a municipal, parl., and county borough, Lancashire, England, on the Douglas, 21 miles north-east of Liverpool. Wigan stands in the centre of an extensive coal-field, and its manufactures, which are important, consist chiefly of calicoes, fustians, checks, and other cotton goods, cotton twist, linens, &c., besides iron-foundries, iron-forges, railway-wagon works, iron-rolling mills, large breweries, chemical works, and corn and paper mills. It sends one member to the House of Commons. Pop. 60,764.

Wight, ISLE OF, an island off the south coast of England, in the county of Hants, separated from the mainland by Spithead and the Solent; 23 miles in length, 13 miles broad; area, 93,341 acres. The main slope of the island is to the north, as is shown by the course of its chief streams, the Medina, Yar, and Eastern Yar. A range of chalk downs, which cross the island from east to west and form excellent sheep-walks, separate it into two districts somewhat different in character. The general appearance is picturesque, and the geology of the island is interesting. The air is remarkably mild, and the district known as the Undercliff, lying along the south coast, and completely sheltered from the north, has long been a resort for invalids. The Isle of Wight is represented in parliament by one member. The chief towns are Newport (the capital), Ryde, Cowes, Ventnor, Bembridge, Freshwater, Yarmouth, and the fashionable health-resorts of Sandown and Shanklin. Near Cowes is Osborne House (which see), once a residence of Queen Victoria. Carisbrooke Castle is an interesting ruin. Pop. 82,387.

Wigton, a town of England, county of Cumberland, 11½ miles south-west of Carlisle. Pop. 3691.

Wigtown, a royal burgh and seaport of Scotland, county town of Wigtownshire, on the w. side of Wigtown Bay, about 7 miles south of Newton-Stewart. Pop. 1886.—The county occupies the south-western extremity of Scotland, forming the western division of Galloway; area, 314,405 acres. The coast is indented by deep and spacious bays, of which Wigtown Bay, Luce Bay, and Loch Ryan are the most important. The chief river is the Cree, which is partially navigable. Except in the peninsular portions the surface is better adapted for pasture than tillage, and a good deal of it is of poor quality. The county returns one member to parliament. Pop. 32,685. Stranraer is the largest town.

Wigwam, an Indian cabin or hut, so called in North America. These huts are



Wigwams of North American Indians.

generally of a conical shape, formed of bark or mats laid over stakes planted in the ground and converging at top, where is an opening for the escape of the smoke.

Wilberforce, SAMUEL, English prelate, son of William Wilberforce, the philanthropist, was born at Clapham in 1805; graduated at Oriel College, Oxford; was appointed curate of Checkendon (1828), rector of Brightstone in the Isle of Wight (1830); became a rural dean (1836), canon of Winchester (1840), Bampton lecturer (1841), dean of Westminster (1845), and in the same year bishop of Oxford. He was the leader of the High Church party, and the author of *Note-book of a Country Clergyman* (1833), *Eucharistica* (1839), *A History of the Protestant Episcopal Church in America* (1844), a volume of *University Sermons*, and numerous other works. He

was killed by a fall from his horse in 1873.

Wilberforce, WILLIAM, English philanthropist, born at Hull 1759, died 1833. After completing his education at St. John's College, Cambridge, he was, in 1780, elected member of parliament for his native town; and in 1784 he was returned by the county of York. In 1786 he made the acquaintance of Clarkson (see *Clarkson, Thomas*), who gained his sympathies on behalf of the agitation against the slave-trade. In 1791 he moved for leave to bring in a bill to prevent further importation of African negroes into the British colonies. Year after year he pressed this measure, but was always defeated till 1807, when it was passed during the short administration of Fox. He then devoted his energies to bring about the total abolition of slavery, and three days before his death he was informed that the House of Commons had passed a bill which extinguished slavery in the British colonies.

Wildbad (vilt'bât), a watering-place of Württemberg, situated in a narrow valley of the Black Forest, on the Enz, 20 miles w. of Stuttgart. It is celebrated for its hot alkaline springs, and is a favourite resort of rheumatic patients. Pop. 3572.

Wild Birds' Protection. By a British act of parliament passed in 1880 all wild birds are protected between 1st March and 1st August, certain of them mentioned in a schedule being prohibited to be killed or taken under a penalty of not more than £1 per bird, the others under a penalty of a reprimand and costs in the first instance, but for every subsequent offence 5s. for each bird and costs in addition. This act was amended by 44 and 45 Vict. cap. li., which excepted birds received from abroad, &c. By subsequent acts county councils may protect any wild birds and their eggs.

Wild-duck. See *Duck*.

Wilhelmshaven, a great naval station belonging to Germany, on the w. side of the Jade, an inlet of the North Sea. The entrances to the harbours are sheltered by long moles, the whole town is strongly fortified, and there are numerous docks, building-slips, machine-shops, &c. Pop. 24,600. See *Jade*.

Wilhelmshöhe. See *Cassel*.

Wilkes, JOHN, born in London 1727, died 1797. He was the son of a rich distiller, and was educated for some time at Leyden. He was returned to parliament as

member for Aylesbury (1757), and attained considerable notoriety by the publication of a paper entitled the *North Briton*, in No. 45 of which (1763) he commented severely on the king's speech to parliament. The home secretary in consequence issued a general warrant, upon which Wilkes, with others, was apprehended and committed to the Tower, but released by Chief Justice Pratt, who declared the prosecution illegal. On the next meeting of parliament, however, a special law was passed to sanction his prosecution, and in 1764 he was expelled from the House of Commons. As he had by this time withdrawn to France and did not appear to receive sentence, he was outlawed. He returned, however, to England at the election of 1768, and was sent to parliament as representative of Middlesex, but was expelled from the House and committed to prison. Three times after this he was re-elected within a few months by the same constituency, but the House of Commons persisted in keeping him out, giving rise to a formidable agitation in favour of 'Wilkes and liberty.' He was released from prison in 1770, having been elected alderman of London, and he was next appointed sheriff of Middlesex, lord-mayor of London, and again (1774) member of parliament for Middlesex. On this occasion he was allowed to take his seat, and in 1782 the resolutions respecting the disputed Middlesex election were expunged from the journals of the House of Commons. He published many speeches and pamphlets, and two collections of his correspondence were published after his death.

Wilkesbarre (wilks'ba-re), a city, United States, capital of Luzerne county, Pennsylvania, on the north branch of the Susquehanna, about 100 miles north-west of Philadelphia. It is the centre of a rich anthracite coal field, and has manufactures of machinery, locomotives, cars, mining engines and tools, iron castings, ropes, brewery products, cutlery, lace, &c. Pop. 51,721.

Wilkie, Sir David, one of the most famous painters of the British school, was son of the minister of Culter, near Cupar, Fifeshire, born there 1785, died at sea off Gibraltar 1841, while returning from a visit to Palestine. He received his early art training at the Trustees' Academy, Edinburgh; entered the schools of the Royal Academy, London, in 1805; first exhibited there (1806) *The Village Politicians*, which at once established his reputation; was

elected an associate of the Academy in 1809, and in 1811 became an academician. In 1825, owing to ill-health, he made an extended tour through Italy, Germany, and Spain. In the latter country his style as a painter underwent a marked change when he came under the influence of Velasquez



Sir David Wilkie.

and Murillo. Returning after three years to England, he was appointed (1830) painter in ordinary to the king, and was knighted in 1836. His pictures, such as *The Blind Fiddler*, *Rent Day*, *Cut Finger*, *Rabbit on the Wall*, *Penny Wedding*, *Cottars' Saturday Night*, *Duncan Gray*, *Blind Man's Buff*, *Chelsea Pensioners reading the Gazette of Waterloo*, *John Knox preaching before the Lords of the Congregation*, &c., are well known as engravings. These belong for the most part to his early and best period, when his method was characterized by subdued colouring and minute and spirited drawing. His later and less successful style is distinguishable by a breadth of treatment which sometimes shows looseness in drawing, and deals chiefly with historical subjects. It is represented by *The Entrance of George IV. into Holyrood*, *The Spanish Council of War*, *The Maid of Saragossa*, *Napoleon and Pius VII.*, and *The Queen's First Council*.

Wilkinson, Sir John Gardner, a distinguished archaeologist, born 1797, died 1875. He was educated at Harrow and Exeter College, Oxford, and afterwards resided twelve years in Egypt. As the result of his investigations there he published the *Manners and Customs of the Ancient Egyptians* (five vols. 1837-41). His other works

are: A Handbook for Travellers in Modern Egypt (1847), A Popular Account of the Ancient Egyptians, Dalmatia and Montenegro (1848), and The Egyptians under the Pharaohs (1857).

Will, *THE*, is usually described as one of the three faculties by means of which the human mind finds expression, the other two being thought (or intellect) and feeling (or emotion). It is the faculty by which a choice is made between two courses of action, as distinct from the exercise of this power, which is more fitly described as volition. This faculty of the will, in the maturity of its complex power, is usually conceived as having been educated by a process of sensation; pleasure and pain giving rise to the motives by which the active determining energy is set in motion. Yet the exact relation between will and motive, the question whether the motive governs the will or the will determines the motive, has never been authoritatively settled. Thus the 'freedom' of the will has, until now, been maintained as a metaphysical and theological belief in opposition to the doctrine of 'necessity.' Aristotle in his *Ethics* incidentally asserted the freedom of the will; with this the Stoics and Epicureans agreed; as did also Justin Martyr, Origen, and St. Augustine; while its later adherents were Reid, Stewart, Kant, and Hamilton. On the contrary, among the early Christians, the Gnostics denied the freedom of the human will; so also did Spinoza; while the more modern advocates of the doctrine of 'necessity' were Hobbes, Hume, Jonathan Edwards, and John S. Mill.

Will, or TESTAMENT, in law, the legal declaration of a man's intentions as to what he wills to be performed after his death in relation to his property. In England, as also in the British colonies and the U. States, no will, whether of real or personal estate, is to be valid unless it be in writing, and signed at the foot or end by the testator, or by some person in his presence, and by his direction. Such signature must be made and the document acknowledged as his will by the testator in the presence of two or more witnesses present at the same time, and such witnesses must attest and subscribe the will in the presence of the testator. Any alteration or obliteration must also be duly signed by the testator and the witnesses. A will may be revoked by cancelling or obliteration, tearing, or burning; or by a new will expressly revoking the former, or containing provisions

inconsistent with it. In Scotland formerly only personal property could be disposed of by will, real property being conveyed by a disposition or deed in which the testator's liferent in the subject was reserved, but heritable property can now be so disposed of.

Willenhall, a town of England, in West Staffordshire, 12 miles N.W. from Birmingham. There are brass and iron foundries, but the staple industry is in locks and padlocks. Pop. 18,518.

Willesden (wilz'den), a parish and urban dist. in Middlesex, a suburb of London, 7 miles N.W. of St. Paul's. It is an important railway junction, has an old church, a public library, and the grounds of the National Athletic Association. Pop. 114,811.

Willet (*Symphemia semipalmata*), a bird of the snipe family found in America. It is a fine game bird, and its flesh and eggs are prized for food. Called also *stone curlew*.

William I., surnamed the *Conqueror*, King of England and Duke of Normandy, born 1027, was the natural son of Robert, duke of Normandy, by Arlotta, the daughter of a tanner of Falaise. His father having no legitimate son, William became the heir at his death, and ruled Normandy with great vigour and ability. The opportunity of gaining a wider dominion presented itself on the death of his second cousin Edward the Confessor, king of England, whose crown he claimed. To enforce this claim he invaded England, and the victory of Hastings, in which his rival Harold was killed, ensured his success (1066). On his return to Normandy, however, the English, being treated by the Norman leaders like a conquered people, broke out into revolt, but William speedily returned and suppressed the insurrection. The resistance of two powerful English nobles, Edwin and Morcar, who had formed an alliance with the kings of Scotland and Denmark, and with the prince of North Wales, soon after drew William to the north, where he obliged Malcolm, king of Scotland, to do homage for Cumberland. In 1069 another insurrection broke out in the north, and at the same time the English resumed arms in the eastern and southern counties, only, however, to be suppressed with merciless rigour. He now established the administration of law and justice on a firm basis throughout England, conferred numerous grants of land on his own followers, and introduced the feudal constitution of Normandy in regard to tenure and services. He also expelled numbers of the

English Church dignitaries and replaced them by Normans. Towards the end of his reign he instituted that general survey of the landed property of the kingdom, the record of which still exists under the title of Domesday Book. Although the English had been completely subdued, William had to suppress several formidable revolts by his own vassals, while in 1080 he was at open war with his son Robert. In 1087 he went to war with France, whose king had encouraged a rebellion of Norman nobles. He entered the French territory, and committed great ravages, but, by a fall from his horse at Mantes, received an injury which caused his death at the abbey of St. Gervais, near Rouen (1087).

William II., surnamed *Rufus*, from his red hair, third son of the preceding, was born in Normandy in 1056, and crowned at Westminster in 1087 on the death of his father. The Norman barons were discontented with this arrangement, and sought to make his eldest brother Robert king of England, but this project was defeated by William, who secured the aid of Lanfranc, archbishop of Canterbury, and the English nobles. Having repressed the conspiracy he forced the Norman barons to withdraw to Normandy and confiscated their English estates. On the death of Lanfranc he also seized the estates connected with the vacant bishoprics and abbeys. In 1090 he sent an army into Normandy, while he himself crossed the Channel the following year. A reconciliation was effected between the two brothers, and in 1096 Robert mortgaged Normandy to his brother for a sum sufficient to enable him to join a crusade to the Holy Land. A characteristic incident in William's reign was his contention with Anselm, archbishop of Canterbury, regarding church property and the sovereignty of the pope. (See *Anselm*.) In 1100 he met his death while hunting in the New Forest, by an arrow shot accidentally or otherwise from the bow of a French gentleman named Walter Tyrrel.

William III., Stadtholder of Holland and King of England, son of William II. of Nassau, prince of Orange, and Henrietta Mary Stuart, daughter of Charles I. of England, was born at the Hague on the 4th of November, 1650. During his early life all power was in the hands of the grand pensionary John De Witt, but when France and England in 1672 declared war against the Netherlands, there was a popular revolt, in which Cornelius and John De Witt were

murdered, while William was declared captain-general, grand-admiral, and stadtholder of the United Provinces. In the campaign which followed he opened the sluices in the dykes and inundated the country round Amsterdam, thus causing the French to retire, while peace was soon made with England. In subsequent campaigns he lost the



William III.

battle of Seneffe (1674) and St. Omer (1677), but was still able to keep the enemy in check. In 1677 he was married, and the Peace of Nijmegen followed in 1678. For some years subsequent to this the policy of William was directed to curb the power of Louis XIV., and to this end he brought about the League of Augsburg in 1686. As his wife was heir presumptive to the English throne he had kept close watch upon the policy of his father-in-law James II., and in 1688 he issued a declaration recapitulating the unconstitutional acts of the English king, and promising to secure a free parliament to the people. Being invited over to England by some of the leading men he arrived suddenly at Torbay, Nov. 5, 1688, with a fleet of 500 sail, and with 14,000 troops. Upon landing a great part of the nobility declared in his favour, and in December James fled with his family to France, after which William made his entry into London. The throne was now declared vacant, the Declaration of Rights was passed, and on Feb. 13, 1689, Mary was proclaimed queen and William king. Scotland soon afterwards followed England's example (with a partial resistance under

WILLIAM IV. — WILLIAM THE SILENT.

Dundee); but in Ireland, whither Louis XIV. sent James with an army, the majority of the Catholics maintained the cause of the deposed king, until they were defeated at the Boyne (1690) and at Anghrim (1691). In the war with France William was less successful; but although he was defeated at Steinkirk (1692) and Neerwinden (1693) Louis was finally compelled to acknowledge him king of England at the Peace of Ryswick in 1697. In 1701 James II. died, and Louis XIV. acknowledged his son as king of England. England, Holland, and the empire had already combined against Louis, and the war of the Spanish Succession was just on the point of commencing when William died, 8th March, 1702, from the effects of a fall from his horse, his wife having already died childless in 1694.

William IV., King of Great Britain and Ireland, and third son of George III., born 1765, died 1837. He served in the navy, rising successively to all the grades of naval command, till in 1801 he was made admiral of the fleet. In 1789 he had received the title of Duke of Clarence, and in June 1830 he succeeded his brother George IV. to the throne. The great events which render his reign memorable are the passage of the reform act, the abolition of slavery in the colonies, and the reform of the poor-laws. He married (1818) Adelaide, sister of the Duke of Saxe-Meiningen, by whom he had no surviving children, but by his connection with Mrs. Jordan the actress he had a large family.

William I., first German Emperor, and seventh king of Prussia, second son of Frederick William III., born 22d March, 1797, died 9th March, 1888. At an early age he began the study of military affairs; took part in the campaign of 1813-14 under Blücher; married in 1829 Princess Augusta of Saxe-Weimar; became heir-presumptive to the throne of Prussia on his father's death in 1840; was commander of the forces which suppressed the revolutionary movement (1849) in Baden; created regent in 1858, and on the death of the king his brother in 1861 he succeeded to the throne of Prussia. During his reign Prussia defeated Denmark (1864), annexing the duchies of Schleswig-Holstein; quarrelled with Austria, and engaged in a campaign which ended in the victory of Sadowa (1866); and went with the rest of Germany to war with France in 1870 (see *Germany* and *France*). In this war the operations of the Prussian generals

were under the personal supervision of the king. It was at Versailles, during the siege of Paris (Jan. 18, 1871) that he was proclaimed German Emperor.

William II., King of Prussia and German Emperor, eldest son of Frederick III. and Victoria, princess royal of England, was born Jan. 27, 1859; educated at Cassel and Bonn, married Augusta Victoria of Schleswig-Holstein-Augustenburg in 1881, and succeeded his father, 15th June, 1888. Since his accession he has shown a great deal of energy in various directions, such as in military affairs and social questions, and his independent spirit brought about the retirement of Bismarck in 1890. See *Germany*.

William the Lion. See *Scotland* (*History*).

William the Silent, Count of Nassau and Prince of Orange, eldest son of William, count of Nassau, was born in 1533, and was educated in the Roman Catholic faith. He had large estates in the Netherlands, and held high offices under Charles V. and his son Philip II.; but the reckless persecution of the Protestants roused him against the Spaniards, and when the Duke of Alva with a Spanish force was sent to subdue the Netherlands (1567) he retired to Germany. He now declared himself a Protestant, and personally led an army into Brabant against Alva, but failed to bring about an engagement. In 1572 the estates appointed the prince stadtholder of Holland, Zealand, Friesland, and Utrecht, with power to prosecute the war against Spain. In 1574 the prince's brothers Louis and Henry were defeated and killed in a battle at Mookerheide, but this disaster was to some extent compensated by the raising of the siege of Leyden. In 1576 the brutality of the Spanish soldiers was such that William was able to negotiate the pacification of Ghent, a treaty in which the provinces bound themselves to expel the Spaniards from the Netherlands. In the troublous times which followed the prince acted with great discretion, and it was by his political prudence that the five northern provinces joined in the Union of Utrecht (1579), and thus laid the foundations of the republic of the United Netherlands. To check this growing power Philip set a price of 25,000 gold crowns upon the head of the prince, with the result that his life was attempted in 1582 at Antwerp, and he was ultimately assassinated at Delft in 1584 by a fanatic named Balthasar Gerard.

Williams, JOHN, missionary, was born near London in 1796; and served as an iron-monger's apprentice. Having been ordained a minister in 1816, he sailed for the South Seas under the auspices of the London Missionary Society; achieved a remarkable success in civilizing the islanders; and after his return to England in 1834 he published the account of his labours in *A Narrative of Missionary Enterprise in the South Sea Islands* (1837). Returning to Polynesia in 1838 he was murdered by the natives of Erromanga in 1839.

Williams, SIR MONIER. See *Monier-Williams*.

Williams, ROGER, a puritan divine and founder of the colony of Rhode Island, North America, was born of Welsh or Cornish parents about 1599, died 1684. He was sent as a scholar to the Charter-house, afterwards he studied either at Oxford or Cambridge, and he is said to have taken orders in the English Church, but because of his puritan beliefs he emigrated in 1631 to New England. Here he became pastor of a church at Salem, until his extreme views regarding the jurisdiction of the civil magistrate caused him to be banished from the colony of Massachusetts. Upon this he repaired with a few companions to Rhode Island and founded a settlement, which he called Providence. He was twice in England in connection with a charter for the colony, and there made the acquaintance of Milton and other prominent puritans. He also published *A Key into the Language of the Indians of America* (1643); *The Bloody Tenent of Persecution for the Cause of Conscience* (1644); *The Bloody Tenent yet more Bloody* (1652); and George Foxe digged out of his Burrows (1676).

Williamsport, a town of the United States, in Lycoming county, Pennsylvania, on the west branch of the Susquehanna. It is a favourite summer residence, and the centre of a large lumber trade. Pop. 28,757.

Williamstown, a seaport in Victoria, on the south-west shore of Hobson's Bay, immediately opposite Sandridge (Port Melbourne), and 9 miles by rail from Melbourne. The piers are commodious, and there are ship-building yards, patent slips, the Alfred Graving Dock, and government workshops. There is a lighthouse on the peninsula on which the town is built, and a lightship further down the bay. Pop. 14,083.

William 'tic, a town of the United States,

in Windham co., Connecticut, an important railroad and industrial centre. Pop. 8648.

Willis, NATHANIEL PARKER, an American author, born at Portland, Maine, 1807; died 1867. He was educated at Boston, Andover, and Yale College; employed by S. P. Goodrich (Peter Parley) to edit *The Legendary* (1828) and *The Token* (1829); established the *American Monthly Magazine*, which was merged in the *New York Mirror*; travelled in France, Italy, Greece, European Turkey, Asia Minor, and finally England; returned to America in 1837, and afterwards edited *The Home Journal*. His numerous published writings include: *Pencillings by the Way* (1835), *Inklings of Adventure* (1836), *Loiterings of Travel* (1839), *People I have Met* (1850), *Famous Persons and Places* (1854), *Outdoors at Idlewild* (1854), *The Convalescent*, his *Rambles and Adventures* (1859).

Willow, the common name of different species of plants belonging to the genus *Salix*, the type of the natural order Salicaceæ. The species of willows are numerous, about 160 having been described, many of which are British. They are all either trees or bushes, and grow naturally in a moist soil. On account of the flexible nature of their shoots, and the toughness of their woody fibre, willows have always been used as materials for baskets, hoops, crates, &c. The wood is soft, and is used for wooden shoes, pegs, and the like; it is also much employed in the manufacture of charcoal, and the bark of all the species contains the tanning principle. The *Huntingdon* or white willow (*Salix alba*) and the *Bedford* willow (*S. Russelliana*) are large trees, yielding a light soft timber, valuable for resisting the influence of moisture or damp. The weeping willow (*S. babylonica*) is a native of China, and is a fine ornamental tree. The willow has for long been considered as symbolical of mourning.

Willow-herb. See *Epilobium*.

Willow-moth, a species of mouse-coloured moth (*Caradrina cubicularis*), the hinder wings of which are pure white. The larvæ feed on grains of wheat, often doing much damage.

Willow-oak, an American tree of the genus *Quercus*, the *Q. Phellos*. The wood is of loose, coarse texture, and is little used.

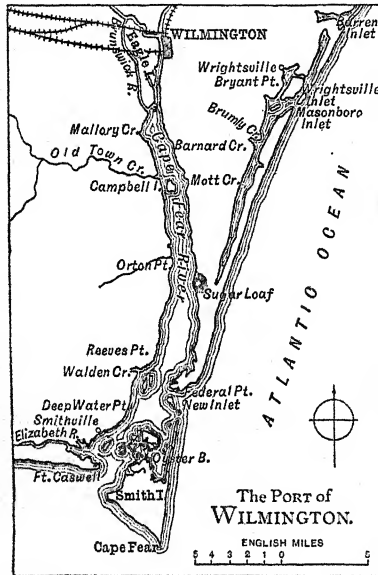
Willow-wren, *Sylvia trochilus*, one of the most abundant of the warblers, and a summer visitant in Britain, with a pleasing song. The general colour is dull, olive-green

WILMINGTON — WILSON.

above, the chin, throat, and breast yellowish-white, and the belly pure white.

Wilmington, a city of the United States, in Delaware, 28 miles south-west of Philadelphia, near the Delaware between Brandywine and Christiana Creeks. It is regularly built, and has a government building, city-hall, court-house, ship-yards, cotton factories, iron-foundries, rolling-mills, potteries, tanneries, powder works, breweries, and an extensive trade. Pop. 76,508.

Wilmington, a port of the United States, in North Carolina, on the Cape Fear River,



160 miles N.E. of Charleston. It is the largest town in the state, has turpentine distilleries, machine-shops, &c., and exports large quantities of cotton and lumber. Pop. 20,976.

Wilna. See *Vilna*.

Wilson, ALEXANDER, the American ornithologist, born at Paisley 1766, died at Philadelphia 1813. He was apprenticed to a weaver, and spent seven years at the loom; afterwards became a pedlar; published a volume of verse, and the poem *Watty and Meg*; was imprisoned for three days for lampooning a Paisley magistrate; emigrated to America in 1794, where he became a schoolmaster; assisted in editing the Ame-

rican edition of Rees's *Cyclopædia*; learnt drawing, and ultimately determined to write and illustrate a work on American birds, being long interested in the subject of ornithology. The result of his labour was the *American Ornithology* (seven vols., 1808-13), a work which was left unfinished by Wilson, but was completed by his friend Ord, while a continuation was subsequently published by Lucien Buonaparte. A bronze statue of Wilson by Mossman has been erected in Paisley.

Wilson, SIR DANIEL, archæologist, was born at Edinburgh in 1816; educated at the university there; became secretary to the Royal Society of Antiquaries; was appointed (1853) professor of history and English literature in University College, Toronto, Canada; and in 1880 was elected president of that institution. He is the author of *Memorials of Edinburgh in the Olden Time* (1846-48); *Oliver Cromwell and the Protectorate* (1848); *The Archæology and Prehistoric Annals of Scotland* (1851); *Prehistoric Man* (1862, revised 1865); *Chatterton*, a biographical study (1869); *Caliban, the Missing Link* (1873); *Reminiscences of Old Edinburgh* (1878); and two volumes of poems. He died in 1892.

Wilson, HORACE HAYMAN, a distinguished orientalist, born 1786, died 1860. He was educated for the medical profession, went out to Bengal as assistant-surgeon in the service of the East India Company; was appointed to an office in the Calcutta mint, of which he afterwards became assay-master and secretary; devoted his leisure to the study of Sanskrit; was elected (1832) Boden professor of Sanskrit at Oxford University; and soon afterwards became librarian at the India House and director of the Royal Asiatic Society. His writings included a *Sanskrit-English Dictionary* (1819), and numerous translations of Sanskrit poems, &c.

Wilson, JOHN, better known in literature as 'Christopher North,' was born in Paisley 1785, died 1854. He was educated at Glasgow University and Magdalen College, Oxford, where he gained the Newdigate prize for an English poem, as also a great reputation for athletics. Leaving Oxford he bought the estate of Elleray, near Windermere, and there formed an acquaintance with Wordsworth, Southey, and Coleridge; contributed to Coleridge's *Friend*, and published a poem called *The Isle of Palms* (1812). Another poem, *The City of the*

Plague, appeared in 1816. Having lost his fortune he passed the Scots bar (1815), settled in Edinburgh, and was long a chief contributor to Blackwood's Magazine, started in 1817. In 1820 he was appointed to the chair of moral philosophy in Edinburgh University, a position which he held until 1851. Besides his numerous magazine articles, the most characteristic of which were some of the *Noctes Ambrosianæ* and those published subsequently as the *Recreations of Christopher North* (1842), he wrote three tales: *The Lights and Shadows of Scottish Life* (1822), *The Trials of Margaret Lindsay* (1823), *The Foresters* (1824), and *An Essay on the Genius and Character of Burns* (1841).

Wilson, JOHN, missionary and oriental scholar, was born at Lauder, Berwickshire, 1804; died 1875. He was educated at the University of Edinburgh, went out to Bombay in the service of the Scottish Missionary Society, and in 1843 transferred his labours to the mission work of the Free Church of Scotland. He established numerous schools; became vice-chancellor of the University of Bombay; contributed largely to the abolition of the practice of suttee; travelled all over India establishing missionary centres; and was universally honoured and beloved by the natives. His linguistic ability was remarkable, and his contributions to literature included: *The Parsi Religion* (1842), *India Three Thousand Years Ago* (1857), *Memoirs on the Cave-Temples of India* (1859), *The Lands of the Bible visited and described* (1867), and *Indian Caste* (1877).

Wilson, RICHARD, an English landscape-painter, born 1714, died 1782. After being a pupil for some years to a portrait-painter in London, he went to Italy, where he met Zuccarelli, who persuaded him to devote himself wholly to landscape. Having stayed some time at Rome and Naples he returned to England in 1755, and settled in the metropolis; but his paintings were treated with much indifference, and he himself lived in abject poverty until his appointment as librarian to the Royal Academy in 1776. He is now, however, regarded as one of the first of English landscape-painters. Among his best works are the *Niobe*, the *Ruins of the Villa of Mæcenas*, *Phaethon*, *Snowdown*, the *View of Rome from the Villa Madama*, &c.

Wilton, an ancient market-town and former parl. bor. of England, Wiltshire, 3 miles n.w. of Salisbury. It has an ornate

Romanesque church, and is famous for carpets. Wilton House is the ancient seat of the Earls of Pembroke. Pop. 2203.

Wilts, or **WILTSHIRE**, a south-western county of England, bounded by the counties of Gloucester, Somerset, Dorset, Hants, and Berks; area, 879,943 acres. It is of a compact and nearly quadrangular form, and is divided by the Upper Avon and Kennet, and the canal between them, into north and south divisions. The north is flat and fertile, and includes Marlborough Downs, upon which is the stone circle of Avebury, while in the south division is Salisbury Plain, an elevated table-land, for the most part uninclosed and uncultivated, on which are the remains of Stonehenge, about 9 miles north of Salisbury. The strata of the county are principally cretaceous, belonging to the great central chalk district of England; and the chief rivers are the Kennet, and the Upper and Lower Avon. The larger proportion of the surface is in pasture, devoted chiefly in the south division to the rearing of sheep, and in the north to cattle-grazing and the dairy; Wiltshire bacon and cheese being famous. The manufactures comprise woollen goods, for which the principal localities are Wilton, Bradford, Trowbridge, Westbury, &c., excellent cutlery and steel goods at Salisbury, ropes and sacking at Marlborough, ironfounding at Devizes, and there are great railway works at Swindon, the largest town. Wiltshire forms five parliamentary divisions, each of which returns one member to parliament; Salisbury, the county town, also sends one member. Pop. 273,869.

Wimbledon, a town of England (giving name to a parl. div.), county of Surrey, 7 miles south-west of London, at the north-east extremity of Wimbledon Common. Up to 1889 the competitions of the National Rifle Association were held here. Pop. 41,652.

Wimborne Minster, a town in Dorsetshire, England, on the river Allen, near its confluence with the Stour. The principal building is the minster, a fine cruciform structure in various styles. Pop. 3696.

Wincey, a strong and durable cloth, plain or twilled, composed of a cotton warp and a woollen weft. Heavy winceys have been much worn as skirtings and petticoats.

Winch, a kind of hoisting machine or windlass, in which an axis is turned by means of a crank-handle, and a rope or chain is thus wound round it so as to raise a weight.

Winchester, an ancient city of England, and a parliamentary and municipal borough, in Hampshire, on the Itchen, 12 miles N.E. of Southampton. The most important edifice is the cathedral, which was built in the latter half of the 11th century, but has since been much added to and altered. It is in the form of a cross; length from east to west, 545 feet, width of the transepts 208 feet. Besides being in itself of great architectural importance, it contains numerous monuments of historical interest; as the tombs of William Rufus, of Edmund, son of King Alfred, and of Izaak Walton; the golden shrine of St. Swithin; bronze figures of James I. and Charles I., &c. The other important buildings and institutions are St. Mary's College or Winchester College, founded by William of Wykeham in 1387, the oldest of the English public schools, with some fine buildings; the town-hall; the old castle, which has been restored; the assize courts; Victoria Hospital; a corn-exchange; barracks; the hospital of St. Cross, founded in 1182; a free library and museum; &c. There are no manufactures or trade of any consequence. The city returns one member to parliament. Pop. 20,919.

Winckelmann, JOHANN JOACHIM, critic and historian of ancient classical art, was born at Stendal, Prussia, in 1717. He was educated at Berlin and Halle; became a Roman Catholic, received a pension from the papal nuncio at Dresden (1755), and visited Rome, where he was appointed librarian to Cardinal Alban. In 1768 he was murdered and robbed in an inn at Trieste. His chief works are *Anmerkungen über die Baukunst der Alten* (1762), *Monumenti Antichi Inediti* (1767), and *Geschichte der Kunst des Alterthums* (1764).

Wind, a current in the atmosphere, as coming from a particular point. The principal cause of currents of air is the disturbance of the equilibrium of the atmosphere by the unequal distribution of heat. When one part of the earth's surface is more heated than another, the heat is communicated to the air above that part, in consequence of which the air expands, becomes lighter, and rises up, while colder air rushes in to supply its place, and thus produces wind. It is thus that the sea-breeze is produced every afternoon at places near the coast, especially in intertropical countries, the ground having been heated by the sun's rays to a higher temperature than the sea; while about twelve hours later, the reverse

effect—a land-breeze—occurs, the ground having fallen at night to a lower temperature than the sea. As the heat of the sun is greatest in the equatorial regions, the general tendency there is for the heavier columns of air to displace the lighter, and for the air at the earth's surface to move from the poles toward the equator. The only supply for the air thus constantly abstracted from the higher latitudes must be produced by a counter-current in the upper regions of the atmosphere, carrying back the air from the equator towards the poles. Besides the unequal distribution of heat already mentioned, there are various other causes which give rise to currents of air in the atmosphere, such as the condensation of the aqueous vapours which are constantly rising from the surfaces of rivers and seas, and the agency of electricity. Winds have been divided into *fixed* or *constant*, as the trade-winds; *periodical*, as the monsoons; and *variable winds*. (See *Trade-winds*, *Monsoon*.) There are also local winds, which receive particular names; as, the *etesian wind*, the *sirocco*, the *simoom*, the *harmattan*, the *mistral*, *typhoon*, &c. The velocity and force of the wind vary considerably, as shown by the anemometer. Thus a light wind travelling at the rate of 5 miles an hour exercises a pressure of 2 oz. on the square foot; a light breeze of 10 miles an hour has a pressure of 8 oz.; a good steady breeze of 20 miles, 2 lbs.; a storm of 60 miles, 18 lbs.; a violent hurricane of 100 miles, 50 lbs., a pressure which sweeps everything before it.

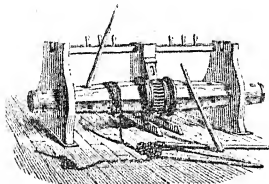
Windermere, or WINANDERMERE, the largest sheet of water in England, and renowned on account of the beauty of its scenery, is partly in Westmoreland and partly in Lancashire. It is about 11 miles long, and averages 1 mile in breadth; its principal feeders are the Brathay and the Rothay, and it has numerous islets.

Windham, WILLIAM, an English statesman, born in London 1750, died 1810. After being educated at Eton, Glasgow, and Oxford, he was returned to parliament (1784) as member for Norwich. Opposed at first to Pitt's administration he joined in Burke's condemnation of the French Revolution, and advocated the war against France; became secretary of war in 1794, and remained in this position until the retirement of Pitt in 1801; took office again in the Grenville administration (1806), and brought forward a bill to limit the term of service in the army,

as also to increase the pay and pensions of officers and men; retired from office (1807), and strenuously opposed the Copenhagen and Walcheren expeditions. He was the friend of Dr. Johnson and Cobbett, and combined the varied qualities of scholar, orator, statesman, athlete, and sportsman.

Wind-instrument, an instrument of music, played by means of artificially-produced currents of wind, as the organ, harmonium, &c., or by the human breath, as the flute, horn, &c. See *Instrument* and *Instrumental Music*.

Windlass, a modification of the wheel and axle used for raising weights. The simple form of the windlass used in ships, for raising the anchors, consists of a strong beam of wood placed horizontally, and supported at its ends by iron spindles, which turn in collars or bushes inserted in what are termed the *windlass bits*. This large axle is pierced with holes directed towards its centre, in which long levers or handspikes are inserted for turning it round when the anchor is to be weighed or any purchase is required. It is furnished with

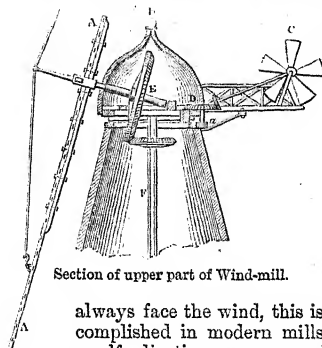


Ship's Windlass.

paucis to prevent it from turning backwards when the pressure on the handspikes is intermitted.

Wind-mill, a mill which receives its motion from the impact of wind upon sails or vanes, and which is used for grinding corn, pumping water, &c. The surfaces of the sails or vanes must be oblique to the wind's direction so as to produce a rotary movement when struck by it. The wind-mill is often a conical or pyramidal tower, as here shown. The wind is made to act upon sails or vanes *A A* attached by means of rectangular frames to the axle or *wind-shaft* of the mill. This axle is placed nearly horizontal, so that the sails by the pressure of the wind revolve in a nearly vertical plane, thus giving a rotatory motion to the driving wheel *E* fixed in the wind-shaft. The movement thus produced is transferred by means of bevel-wheels to the main shaft *F*, which

is connected with the specific machinery of the mill. As the sails to be effective must



Section of upper part of Wind-mill.

always face the wind, this is accomplished in modern mills by a self-adjusting cap *B*, moved by a fan or flyer *C* attached to the projecting framework at the back of the cap. By means of a pinion on its axis, motion is given to the inclined shaft and to the wheel *D* on the vertical spindle of the pinion *a*; this latter pinion engages the cogs on the outside of the fixed rim of the cap, and by these means the sails are kept constantly to the wind, when the wind causes the fan *C* to revolve. In a *horizontal* wind-mill the wind-shaft is vertical, so that the sails revolve in a horizontal plane. In most of the wind-mills used in America the sails consist of narrow boards arranged in a circular framework at a constant angle to catch the wind. Such mills are now common in Britain for pumping water. Windmills are particularly common in Holland. There seems a field before them as generators of electricity, stored by accumulators.

Window, an opening in the wall of a building to admit light and air into the interior. In dwelling-houses in ancient times the windows were narrow slits, and it was not until about the end of the 12th century that glass was used to any great extent in private houses in England. Windows, properly so-called, were almost unknown in the religious edifices of the Egyptians, Greeks, and Romans, the light being admitted at the roof, but they constitute an essential and distinguishing feature of the Gothic style. In modern houses windows are made capable of being opened and shut by means of casements or sashes. In Britain a window-tax was imposed in 1695, and in 1851, when the tax was abolished, each house having more than seven windows was taxed.

Windpipe. See *Trachea*.

Windsor, or NEW WINDSOR, a municipal and parliamentary borough of England, county of Berks, beautifully situated on the Thames, 22 miles w. from London, and connected by a bridge with Eton. There are several churches and chapels, barracks, an infirmary, &c. The only manufacture of importance is that of tapestry. Windsor sends one member to parliament. Pop. of municipal borough, 13,958; parliamentary borough, 21,477. Windsor owes its chief importance to its castle, which stands east of the town on a height overlooking the river Thames, and is the principal royal residence in the kingdom. It was begun, or at least enlarged, by Henry I., and has been altered and added to by almost every sovereign since. The castle stands in the Home Park or 'Little Park,' which is 4 miles in circumference, and this again is connected with the Great Park, which is 18 miles in circuit, and contains an avenue of trees 3 miles in length. The chief features of interest in the castle are the old state apartments; St. George's Chapel, where the Knights of the Garter are installed, and the vaults of which contain the remains of Henry VI., Edward IV., Henry VIII., Charles I., George III., George IV., and William IV.; the Round Tower or ancient keep; and the present state apartments. In the Home Park is Frogmore, with the mausoleum of the Prince Consort and Queen Victoria; and in the Great Park is a large artificial lake called Virginia Water.

Windward Islands, one of the divisions of the Lesser Antilles in the West Indies, so called in opposition to another division of the same, called the *Leeward Islands*. The term is vaguely used, but generally includes Martinique, St. Lucia, St. Vincent, Grenada, Barbadoes, and Tobago.

Wine is the term specifically applied to the fermented juice of the grape or fruit of the vine, though it may also be applied to the fermented juice of any fruit. (See *Vine*.) Wines are distinguished practically by their colour, hardness or softness on the palate, their flavour, and their being still or effervescing. The differences in the quality of wines depend partly upon differences in the vines, but more on the differences of the soils in which they are planted, in the exposure of the vineyards, and in the treatment of the grapes, and the mode of manufacturing the wines. When the grapes are fully ripe, they generally yield the most

perfect wine as to strength and flavour. The juice is expressed from the grapes by means of presses of all varieties of construction, from the simple lever and wedge press to the machine with hydraulic power. It is usual to separate the juice as it is expressed into first, second, and third 'runs,' the first pressing being the best quality, and the amount of all the juice is usually about 70 per cent of the weight of the grapes. The juice of the grape when newly expressed, and before it has begun to ferment, is of a sweet taste, and is called *must*. The fermenting process requires much time and attention, and if it be arrested while part of the sugar is unchanged a *fruity* wine is the result. If the process, however, is completed, and all the sugar converted into alcohol, a *dry* wine is obtained. When an *effervescing* wine, like champagne, is desired the fermenting liquid is bottled, and the process of fermentation completed in the bottle, where the carbonic acid gas remains to give it a sparkling effervescent quality. When the wine is *red* in colour it shows that the skins of the grape have remained in the vat during fermentation, while in *white* wines the skins have been removed before that process is begun. The leading character of wine must be referred to the alcohol which it contains, and upon which its intoxicating powers principally depend. The amount of alcohol in the stronger ports and sherries is from 16 to 25 per cent; in hock, claret, and other light wines from 7 to 12 per cent. Wine containing more than 13 per cent of alcohol may be assumed to be fortified with brandy or other spirit. The most celebrated ancient wines were those of Lesbos and Chios among the Greeks, and the Falernian and Cecuban among the Romans. The principal modern wines are Port, Sherry, Claret, Champagne, Madeira, Hock, Marsala, &c. The varieties of wine produced are almost endless, and differ in every constituent according to the locality, season, and age. The principal wine-producing countries are France, Germany, Spain, Portugal, Italy, Sicily, Greece, Cape Colony, Australia, and the U. States. The money value of the wine imported into the United Kingdom in 1901 was £4,931,335; in 1905, £4,072,199. The value from France in 1905 was £2,222,239, from Portugal £861,607, from Spain £437,113, from Germany £220,000, from Australia £136,780.

Wine-measure, an old English measure by which wines and other liquors were sold.

In this measure the gallon contained 231 cubic inches, and was to the imperial standard gallon as 5 to 6 nearly.

Winged Bull, an architectural decoration common in ancient Assyrian temples, where winged human-headed bulls and lions of colossal size usually guarded the portals. They were evidently typical of the union of intellectual and physical powers.

Winged Lion, the symbol of the evangelist St. Mark, adopted as the heraldic device of the Venetian Republic. A celebrated bronze figure of the winged lion of St. Mark, surmounting a red granite column formed out of a single block, stands in the Piazzetta of St. Mark at Venice.

Wing-shell. See *Pinna*.

Winnipeg, a lake of Canada, mainly in Manitoba; length, about 250 miles; greatest breadth, 70 miles. The Winnipeg, Red River, and Saskatchewan are its tributaries, and it receives the surplus waters of lakes Winnipegosis and Manitoba, while its own surplus waters are carried by the Nelson into Hudson Bay. The river Winnipeg rises in the Lake of the Woods, length 250 miles, interrupted by falls.

Winnipeg, the third city of Canada, capital of the province of Manitoba, at the confluence of the Red River and Assiniboine, 40 miles s. by w. of Lake Winnipeg. In 1870 it was only a village; its growth has been due in great measure to its central position on the continent, forming a gateway to the west and north-west, and in a region whose agricultural and other resources have been rapidly developed, so that by help of railways and rivers it has become a great commercial and financial centre, with fourteen main and other railway lines radiating from it. It is a great grain market, and has a large trade in cattle, flour, cheese, furs, &c., while manufacturing industries are making rapid progress. It has wide and regular streets and boulevards, many fine buildings, and extensive park areas. The provincial university is well endowed and has four colleges affiliated to it. Pop. in 1901, 42,340; in 1908, 125,000.

Winona, a city of the U. States, in Minnesota, beautifully situated on the west bank of the Mississippi, an important centre of trade and manufactures. Pop. 19,714.

Winslow, FORBES BENIGNUS, physician, born in London 1810, died 1874. He was educated in Scotland and Manchester; studied medicine at New York and London

University; passed the College of Surgeons in 1835; and in 1849 graduated M.D. at Aberdeen. He devoted himself chiefly to the investigation of mental disease, and published *The Application of Phrenology to the Elucidation and Cure of Insanity* (1831), *Anatomy of Suicide* (1840), *Insanity in Criminal Cases* (1843), *Obscure Diseases of the Brain and Disorders of the Mind* (1860), &c.

Winter, the coldest season of the year, in the northern hemisphere comprising the months of December, January, and February. The astronomical winter begins on the shortest day (December 22) and ends with the vernal equinox (March 21).

Winter-cherry. See *Strawberry-tomato*.

Winter-cress, the common name of two British cruciferous plants of the genus *Barbarea*. *B. vulgaris*, called also *yellow rocket*, grows on the banks of ditches and rivers, and about hedges and walls. It is bitter and sharp to the taste, and is sometimes used as a salad.

Winter-green, a name of several plants, one of them being the partridge-berry (which see). The name is also given to a genus of perennial plants (*Pyrola*), order Pyrolaceæ, having short stems, broad evergreen leaves, and usually racemose white or pink flowers. *P. rotundifolia* possesses astringent properties and was formerly used in medicine.

Winter-moth, a moth (*Cheimonobia brunata*), the larvæ of which are exceedingly injurious to apple, pear, cherry, and plum trees. The moths appear in their perfect state in the beginning of winter.

Winter's-bark (*Drimys Winteri*), a plant of the nat. order Magnoliaceæ, a native of South America. It is an evergreen shrub, the bark of which has an agreeable pungent aromatic taste, and tonic properties.

Winter Solstice. See *Solstice*.

Winterthur (vin'tér-tör), a busy town of Switzerland, canton of Zürich, on the Eulach, 12 miles north-east of Zürich. It carries on cotton-spinning, silk-weaving, iron-foundries, machine-making, &c. Pop. 25,700.

Wire, any metallic substance drawn to an even thread or slender rod of uniform diameter by being passed between grooved rollers or drawn through holes in a plate of steel, &c. Wire is usually cylindrical, but it is also made of various other forms. The metals most commonly drawn into wire are gold, silver, copper, and iron; but the finest wire is made from platinum. *Wiredrawing* is the name for the process of making wire

The metal to be drawn is first hammered into a bar, and then passed successively through a series of holes in a hardened steel plate, successively diminishing in diameter. Extremely fine gold and platinum wires for the spider-lines of telescope micrometers are made, some of these having a diameter of only $\frac{1}{15000}$ of an inch. The applications of wire are very numerous and interesting. Ropes of wire are extensively used for winding purposes in mines, and generally for all similar purposes. They are much used for the standing rigging of ships, for telegraph purposes, &c. The conducting part of submarine telegraph cables is simply a wire-robe of copper wires, with an outside protection of some kind. (See *Submarine Cable*.) Wire-gauze for blinds, &c., is woven in the same manner as ordinary textile fabrics. Fences, book-sewing, strings for musical instruments, pins and needles, &c., are among the innumerable uses to which wire is adapted. See also *Barbed Wire*.

Wireworm, a name given by farmers to the larvæ or grubs of several insects, which are species of the coleopterous family Elateridæ. They are said to live for years in the larva state, during all which time they are very destructive to vegetation. The name of *wireworm* is derived from their round form and hard nature.

Wirksworth, a market-town in Derbyshire, England, 13 miles N.W. from Derby. Pop. 3807.

Wirttemberg. See *Württemberg*.

Wisbeach, or **WISBECH**, a town and port, England, in the Isle of Ely, Cambridgeshire, on the Nene. The river admits of vessels of 500 tons discharging near the town, and the chief trade is in exports of agricultural produce and imports of coal and timber. Pop. 9531.

Wisby, or **VISBY**, a seaport in Sweden, on the W. coast of the island of Gotland, at one time an important town in the Hanseatic League. It has a fine cathedral. Pop. 3776.

Wisconsin, a river in the United States, rises on the northern border of Wisconsin state, runs southward, becomes navigable at Portage City, and enters the Mississippi 4 miles below Prairie-du-Chien after a course of nearly 600 miles. It is remarkable for its rapids and falls.

Wisconsin, one of the United States of North America, bounded north by Lake Superior, north-east by Michigan, east by Lake Michigan, south by Illinois, and west by Iowa and Minnesota, the Mississippi

river separating it from these states; area, 56,040 sq. miles. It consists of an undulating plateau, varying from 600 to 1500 feet above sea-level. Besides Michigan and Superior there are numerous small lakes; the chief rivers, which drain into the Mississippi, are the St. Croix, Chippewa, and Wisconsin. In winter the weather is severe, but on the whole the climate is dry and healthy. Agriculture is the chief industry, and the principal products are wheat, Indian-corn, and oats, besides rye, barley, potatoes, hops, and maple sugar. Cattle and horses are extensively reared, and agricultural and dairy produce are largely exported, as also lumber. The manufactures in the cities are chiefly furniture, agricultural implements, carriages, saddlery, woollen goods, &c. There are extensive iron-mines, besides lead and zinc deposits and granite and limestone quarries. Elementary education is compulsory between the ages of seven and fifteen (for 12 weeks each year); there are a number of universities and colleges, the Wisconsin University, Madison, being liberally subsidized by the state. The state was admitted to the Union in 1848. The inhabitants to a large extent are German in origin; Milwaukee is the chief town, and Madison the capital. Pop. 2,069,042.

Wisdom, *Book of*, called by the Septuagint the *Wisdom of Solomon*, one of the apocryphal books of the Old Testament. It was considered canonical by some of the fathers of the church, who ascribed its authorship to Solomon; but it is now generally held to be apocryphal, most theologians agreeing that its author must have been a Jew of Alexandria of the 1st or 2d century B.C.

Wiseman, **NICHOLAS**, CARDINAL, born of Irish parents at Seville 1802, died 1865. He was educated at Waterford and the Roman Catholic College, Ushaw, near Durham; joined the English College then newly formed (1818) at Rome; became professor of oriental languages and (1828) rector of the English College; returned to England (1835), and was appointed successively rector of Ushaw, vicar apostolic of the central district of England, and Roman Catholic archbishop of Westminster (1850). He was the author of *Lectures on the Connection between Science and Revealed Religion* (1836), *Letters on Catholic Unity* (1842), *Papal Supremacy* (1850), *Fabiola* (1854), *Four Last Popes* (1858), and joint-editor for many years of the *Dublin Review*.

Wishart, GEORGE, one of the first martyrs to the Protestant religion in Scotland, was born in Kincardineshire early in the 16th century; educated at Aberdeen; travelled in France and Germany, where he accepted the Reformed doctrines; returned to Scotland and began to teach, but was prosecuted for heresy; fled to England in 1538, and remained in Cambridge for six years; returned to Scotland in 1543, and preached in the chief towns, for which offence, at the order of Cardinal Beaton, he was arrested in the house of Cockburn of Ormiston, tried by a clerical assembly in St. Andrews, and burned at the stake there in 1546.

Wish'aw, a police burgh, Scotland, Lanarkshire, 15 miles S.E. of Glasgow. It has several large coal-mines, iron, steel, and nail works, fireclay brick-works, railway-wagon works, a distillery, &c. Pop. 20,869.

Wismar, a seaport town in Mecklenburg-Schwerin, North Germany, situated at the head of a bay in the Baltic, 18 miles N.E. of Schwerin. It has some manufactures, an excellent harbour, and a considerable trade in coal, timber, iron, &c. Pop. 20,222.

Wissembourg. See *Weissenburg*.

Wista'ria, a genus of plants, nat. order Leguminosæ. The species are deciduous, twining, and climbing shrubs, natives of China and North America. Several (as *Wistaria chinensis*) have been introduced into England, and, when in flower, they form some of the handsomest ornaments of the garden. *W. frutescens* is a species belonging to the United States.

Witchcraft, a supernatural power which persons were formerly supposed to obtain by entering into compact with the devil, who engaged that they should want for nothing, and be able to assume whatever shape they pleased, to visit and torment their enemies, and accomplish their infernal purposes. As soon as the bargain was concluded, the devil was said to deliver to the witch an imp or familiar spirit, to be ready at call, and to do whatever it was directed. By the aid of this imp and the devil together, the witch, who was almost always an old woman, was enabled to transport herself through the air on a broomstick, and to transform herself into various shapes, particularly those of cats and hares; to inflict diseases on whomsoever she pleased, and to punish her enemies in a variety of ways. The belief in witchcraft is very ancient. It was a common belief in Europe till the 16th century, and maintained its ground

with tolerable firmness till the middle of the 17th century. Indeed it is not altogether extinct even at the present day. Numbers of reputed witches were condemned to be burned, so that in England alone it is computed that no fewer than 30,000 of them suffered at the stake. The last victim was executed in 1722 in Scotland, and in the United Kingdom prosecution for witchcraft was abolished in 1736 by act of parliament. In America the last executions took place in 1692, and in France executions for witchcraft were prohibited by an edict of Louis XIV. as early as 1670.

Witch-hazel. See *Wych-hazel*.

Witenagemot (*wit'e-na-ge-mot*); literally, 'meeting of the wise men', among the Anglo-Saxons, the great national council or parliament, consisting of athelings or princes, nobles or ealdormen, the large landholders, the principal ecclesiastics, &c. The meetings of this council were frequent; they formed the highest court of judicature in the kingdom; they were summoned by the king in any political emergency; their concurrence was necessary to give validity to laws, and treaties with foreign states were submitted to their approval. They had even power to elect the king. See *Anglo-Saxons*.

Wither, GEORGE, an English poet, was born in Hampshire 1558, died 1667. He was educated at Magdalen College, Oxford; afterwards entered himself a student of Lincoln's Inn; and in 1613 published his satires entitled *Abuses Stript and Whipt*, the severity of which led to his confinement in the Marshalsea. Having been released he took an active part on the side of parliament when the civil war broke out, and sold an estate to raise a troop of horse. Under the Long Parliament he enjoyed various lucrative employments, which were lost to him at the Restoration. He was afterwards imprisoned for publishing a piece called *Vox Vulgi*. His more important works are: *The Shepherd's Hunting* (1615), *Britain's Remembrancer* (1627), *A Collection of Emblems and Hallelujah* (1643).

With'erite, a mineral, a carbonate of baryta, used in making plate-glass, &c.

Witness, in law, (a) one who signs his name as evidence of the genuineness of another signature; (b) a person who gives testimony or evidence under oath or affirmation in a judicial proceeding. See *Evidence*.

Witney, a market-town in England, co. of Oxford, 11 miles W. by N. of Oxford city; famous for blankets. Pop. 3574.

Witt, DE. See *De Witt*.

Witten, a town of Prussia, in the province of Westphalia, 32 miles W.N.W. of Arnsberg, on the Ruhr. The chief industries are connected with iron and steel, lead, chemicals, plate-glass, fire-brick, &c. Pop. 35,800.

Wittenberg, a town in Prussia, province of Saxony, on the right bank of the Elbe, 45 miles south-east of Magdeburg. It was while Luther was a professor in Wittenberg that he nailed his ninety-five theses to the door of the Schlosskirche. The university of which he was professor was united to Halle in 1817. The principal buildings are the Schlosskirche, in which both Luther and Melancthon are buried; the Stadtkirche, where Luther and Melancthon preached; the remains of the Augustine monastery, with Luther's apartments; the houses of Melancthon and Cranach; the town-hall, the gymnasium, &c. Pop. 20,300.

Wittenberge, an industrial town of Prussia, district of Potsdam, at the junction of the Stepenitz with the Elbe. Pop. 16,258.

Woad, a cruciferous plant of the genus *Isatis*, the *I. tinctoria*, formerly cultivated to a great extent in Britain on account of the blue dye extracted from its pulped and fermented leaves. It is now, however, nearly superseded by indigo, which gives a stronger and finer blue. The ancient Britons are said to have coloured their bodies with the dye procured from the woad plant. *Wild woad*, *weld*, or *wold* is the *Reseda luteola*, a British plant, which yields a beautiful yellow dye. See *Dyer's-weed*.

Woburn, a town of the United States in Middlesex county, Massachusetts, 10 miles N.W. of Boston. Its principal industry is in the manufacture of leather. Pop. 13,499.

Wodan, WODEN, the Anglo-Saxon form of the name of the deity called by the Norse Odin. *Wednesday* derives its name from him, and his name is also seen in several place-names, as *Wednesbury*, &c. See *Odin*.

Wodrow, ROBERT, a Scottish clergyman and historian, born in 1679, died 1734. He was educated at Glasgow University, and became minister of the parish of Eastwood, Renfrewshire, in 1703, where he remained all his life. He published *The History of the Sufferings of the Church of Scotland from the Restoration to the Revolution* (two vols., 1721), and wrote a series of Scotch ecclesiastical biographies, the MSS. of which are preserved in Glasgow University. From these there has been edited for the Maitland

Club, by Rev. Dr. Leishman, *Lives of the Reformers and most Eminent Ministers of the Church of Scotland* (three vols., 1834-45). He has also edited *Wodrow's Analecta*, or *Materials for a History of Remarkable Providences* (four vols., 1842-43); and the Wodrow Society (for the publication of works of the early writers of the Church of Scotland) has published *Wodrow's Correspondence* (1842-43), edited by the Rev. T. M'Crie.

Woiwode, an old Slavonic name for a general, afterwards used as equivalent to ruler, governor, prince.

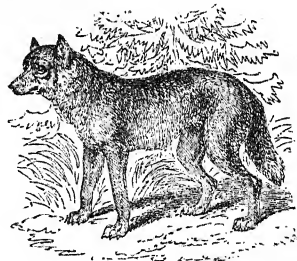
Woking, town of England, Surrey, 6 miles N. of Guildford. Pop. 16,222.

Wokingham, a mun. bor. of England, Berks, in Windsor Forest; gives name to a parl. div. Pop. 3551.

Wolcot, JOHN, M.D., an English writer, generally known by his nom-de-plume of 'Peter Pindar,' was born in 1738, and died in 1819. He studied medicine; resided some time in Jamaica, where he took clerical orders; and afterwards established himself in Cornwall, where he discovered the artistic genius of the painter Opie. He published a number of satirical poems, and in particular turned his humour upon George III. Between 1778 and 1808 he is said to have put forth some sixty satirical productions in verse, most of them now forgotten.

Wold, or WELD. See *Dyer's-weed*.

Wolf, a quadruped belonging to the digitigrade carnivora, and very closely related to the dog. The common European wolf (*Canis lupus*) is yellowish or fulvous gray; the hair is harsh and strong, the ears erect



Common Wolf (*Canis lupus*).

and pointed, the tail straight, or nearly so, and there is a blackish band or streak on the forelegs about the carpus. The height at the shoulder is from 27 to 29 inches. The wolf is swift of foot, crafty, and rapacious; a destructive enemy to the sheep-cote and

farm-yard; it associates in packs to hunt the larger quadrupeds, such as the deer, the elk, &c. When hard pressed with hunger these packs have been known to attack isolated travellers, and even to enter villages and carry off children. In general, however, wolves are cowardly and stealthy. Wolves are still plentiful in some parts of Europe, as in districts of France, Spain, Italy, Germany, Turkey, and Russia; they probably ceased to exist in England about the end of the 15th century; the last of them in Scotland is said to have been killed by Cameron of Lochiel in 1680, while in Ireland they are known to have existed until at least the beginning of the 18th century. The wolf of N. America is generally considered to be the same species as the European wolf, though individuals vary much in colour and otherwise. The little prairie-wolf or coyote (*C. ochropus*), abounding on the vast plains of Missouri and Mexico, is a burrowing animal. The Tasmanian wolf is a marsupial.

Wolf (wolf), **FRIEDRICH AUGUST**, German critic and scholar, born in 1759, died in 1824. His fame as a critic rests upon his *Prolegomena* to Homer (1795), in which he endeavours to show that the *Odyssey* and *Iliad* in their present form are not the work of one hand, but of several. This opinion he further defended in his *Letters to Heyne* (1797). See *Homer*.

Wolfe, **REV. CHARLES**, author of the *Ode on the Burial of Sir John Moore*, was born in Dublin 1791, died 1823. He was educated at Trinity College, Dublin, and it was while there that the poem which has secured his fame was published in the *Newry Telegraph* (1817). He was also the author of several other poems, and his *Remains* were published at Dublin (two vols., 1825).

Wolfe, **JAMES**, an English general, was born at Westerham, Kent, in 1727; entered the army and proceeded with his regiment to the Low Countries; took part in the battles of Dettingen, Fontenoy, Falkirk, Culloden, and Laffeldt, being wounded in the last. After distinguished service against the French in America he was intrusted (1759) with an army of 8000 men with which to assault Quebec. During the night this small force scaled the Heights of Abraham, which commanded the town, and in the battle which took place next day the British were victorious; but General Wolfe was wounded in the engagement, and died in the moment of victory, his opponent Montcalm being also mortally wounded.

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Wolfenbüttel (volf'en-büt-l), a town in Brunswick, Germany, on the Oker, 7 miles south of Brunswick. It has a castle, town-house, arsenal; a library of about 300,000 volumes, besides MSS.; a statue of Lessing, who was long librarian to the duke; a gymnasium, &c. Pop. 17,883.

Wolfian Bodies (after *Wolff*, the discoverer), in physiology, a term applied to certain bodies in the vertebrate embryo, preceding the two kidneys, whose functions they perform. As the fœtus advances they gradually disappear, their place being supplied by the true kidneys, except in fishes, in which they are permanent.

Wolf-fish. See *Sea-wolf*.

Wolfram, a native tungstate of iron and manganese. Its colour is generally a brownish or grayish black. It occurs massive and crystallized, and in concentric lamellar concretions, and is the ore from which the metal tungsten is usually obtained.

Wolfram von Eschenbach. See *Eschenbach*.

Wolf's-bane, a poisonous plant of the genus *Aconitum* (*A. Napellus*). It is a native of Alpine pastures in Switzerland, and found in a wild state in one or two parts of England. See *Aconite*.

Wollaston, **WILLIAM HYDE**, a distinguished chemist, born in London 1776, died 1828. He was educated at Cambridge, took the degree of M.D., practised as a physician in London, but finally devoted himself to scientific research. He was the inventor of the goniometer, an instrument for measuring the angles of crystals, and the discoverer of palladium and rhodium, and the malleability of platinum.

Wollin (vol'in), an island of Prussia at the mouth of the Oder, on the north side of the Great Haff; length, 20 miles; breadth, from 3 to 10 miles. Fishing and cattle-rearing are the chief employments. Pop. 14,000.

Wolseley (wulz'li), **SIR GARNET JOSEPH**, **VISCOUNT WOLSELEY**, British general, son of Major Garnet Wolseley, was born near Dublin in 1833; entered the army as ensign in 1852; took part in the second Burmese war (1852-53), where he was severely wounded; served with distinction in the Crimea, and was wounded at the siege of Sebastopol; engaged in the siege and capture of Lucknow during the Indian mutiny of 1857-58; and was employed in 1860 in the Chinese war. He was despatched to Canada in 1861, and again in 1867, having

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received command of the Red River expedition, which he carried to a successful issue. Three years afterwards Wolseley (now K.C.M.G. and major-general) was appointed to the command of an expedition to punish the King of Ashantee, and after a brief campaign he entered Coomassie (Feb. 1874) and received the submission of the king, being rewarded by a grant of £25,000 and the dignity of K.C.B. After the defeat of a British force by the Zulus in South Africa in 1879 he was despatched as high commissioner, but before his arrival the Zulus had been defeated at Ulundi, and little remained for him to do. His next command was in Egypt in 1882, where his forces successfully stormed the lines of Tel-el-Kebir and captured Arabi Pasha. For this he received the thanks of parliament and was created a baron, his army rank being also raised to that of general. His next appointment was as adjutant-general of the forces. When the Mahdi subdued the Soudan, and held General Gordon prisoner in Khartoum, Wolseley was despatched in 1884 with a relief expedition. He concentrated his forces at Korti, and sent a column across the desert to Khartoum, but the place had fallen. In 1885 he was created a viscount, in 1890-95 was commander-in-chief in Ireland, in 1894 made field-marshal; commander-in-chief of the army, 1895-1900. He is author of *Narrative of the War with China*, the *Soldier's Pocket Book*, *Life of the Duke of Marlborough*.

Wolsey (wul'zi), THOMAS, CARDINAL, said to have been the son of a butcher, was born at Ipswich in 1471. He was educated at Magdalen College, Oxford, where he took his degrees as a scholar of distinction. After quitting the university he was appointed to the parish of Lymington in Somerset. Then he became a private chaplain to the Archbishop of Canterbury, one of the governors of Calais, chaplain to Henry VII., and latterly Dean of Lincoln. When Henry VIII. became king the advancement of Wolsey was rapid. Successively he was appointed Canon of Windsor, Dean of York, Bishop of Lincoln, Archbishop of York, and his nomination as cardinal in 1515 and pope's legate in 1518 completed his ecclesiastical dignities. In 1515 he was also appointed lord-chancellor of the kingdom. He was twice a candidate for the papacy, and his power in England, as also his revenues, were only equalled by those of the crown. Part of his immense revenues he expended in display,

and part more laudably for the advancement of learning. He projected on a magnificent scale the College of Christ Church at Oxford; founded several lectures, and built the palace at Hampton Court, which he presented to the king. This rapid preferment by the king was largely the result of a remarkable series of diplomatic victories, in which Wolsey had been the means of enabling Henry to hold the balance between Francis I. and the Emperor Charles V. His success in the region of politics terminated in the splendours of the Field of the Cloth of Gold (1520). In his ambitious career the cardinal had made many enemies, who were held in check so long as he retained the favour of his royal master. This favour Wolsey lost when he failed to obtain from Pope Clement a decision granting the king's divorce from Catharine of Aragon. Thenceforth the enemies of the fallen prelate harried him unmercifully. He was banished from court, stripped of his dignities, found guilty of a præmunire, and sentenced to imprisonment. Finally, after a brief respite, during which he was restored to some of his offices, and had returned to his see of York, he was arrested at Cawood Castle on a charge of high treason, and on his way to London as a prisoner he died in 1530 of dysentery at Leicester Abbey.

Wolstonecraft, MARY. See *Godwin*, Mary.

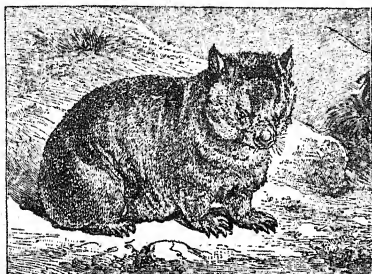
Wolverene. See *Glutton*.

Wolverhampton, a municipal, county, and parl. borough of England, county of Stafford, 13 miles N.W. of Birmingham. It is beautifully situated, and during late years has made extraordinary progress. The more important edifices are the collegiate church of St. Peter, a handsome R. Catholic chapel designed by Pugin, an exchange, a market-hall, art gallery, town-hall, &c. It is situated in the heart of the Midland mining district, has extensive beds of coal and ironstone in its vicinity, is the largest manufacturing town in Stafford, and is known as the capital of the Black Country. The chief industries are the smelting of iron ore, and its conversion into all forms of iron-ware, and manufactures in brass, tin, steel, papier-mâché, galvanized iron, and chemicals. The parliamentary borough forms three divisions, each sending a member to parliament. Pop. 192,761; co. bor., 94,187.

Womb. See *Uterus*.

Wombat (*Phascogale wombat*), a marsupial animal, a native of Australia and Tasmania. It is about 3 feet in length, and

has coarse, almost bristly fur, of a general gray tint, mottled with black and white. It



Wombat (*Phascolomys wombat*).

burrows, feeds on roots, and its flesh is said in fatness and flavour to resemble pork.

Wombwell, a town in the West Riding of Yorkshire, about 5 miles S.E. of Barnsley, with extensive coal-mines in the neighbourhood. Pop. 13,252.

Women's Rights is the term applied to the claims, made on behalf of women, to a legal, political, educational, and social status equal to that of men. The modern movement in this direction dates from about 1848, having begun in the U. States. Notwithstanding the ridicule which assailed its early advocates, the claims of women have been largely recognized in more recent legislation in Britain and British colonies, as well as in America. The extension of the municipal, school-board, and county-council franchises to women; the Married Women's Property Act (1882); and the admission of women to university degrees, including those in the medical faculty, are among the more obvious evidences of the advance of this movement in the United Kingdom.

Wonders of the World, SEVEN. See *Seven Wonders*.

Woo-Chang, a city of China, province of Hu-Pé, on the Yang-tse-kiang, opposite the city of Hankow. The latter is in effect but a suburb of Woo-Chang, another portion on the N. bank of the river being Hang-Yang-Poo. It is the great emporium for the tea exported by way of Shanghai. Pop. 1,000,000.

Wood. See *Timber*.

Wood, ANTHONY, antiquary, born at Oxford in 1632, died 1695. He was educated at Merton College, Oxford, where he took his degrees, and spent his life in examining and sifting the records of the university.

The result of his laborious researches was published as *Historia et Antiquitates Universitatis Oxoniensis* (1674), this being a Latin translation of Wood's English treatise under the authority of the university. He was also the author of *Athenæ Oxonienses* (1691-92).

Wood, ELLEN, or PRICE, English novelist, better known as *Mrs. Henry Wood*, born at Worcester 1820, died 1887. Among her many novels may be noted *East Lynne*, which has had an enormous success both as a book and a drama; *The Channings*; *St. Martin's Eve*; *A Life's Secret*; *Roland Yorke*; *Dene Hollow*; and the *Johnnie Ludlow Stories*, reprinted from the *Argosy*, of which she was long editor.

Wood, REV. JOHN GEORGE, naturalist, born in London 1827, died suddenly at Coventry 1889. He was educated at Ashbourne Grammar-school and at Merton College, Oxford; was ordained in 1852, and was for some years chaplain to St. Bartholomew's Hospital. He was an enthusiast in natural history, and published a large number of books on zoology and kindred subjects which had great popularity. Among the best known of them are: *Common Objects of the Sea-shore*; *Common Objects of the Country*; *Homes without Hands*; *Insects at Home*; *Natural History of Man*; and an admirable illustrated *Natural History of Animals*.

Woodbine. See *Honeysuckle*.

Woodbridge, a town and river port, county of Suffolk, 77 miles N.E. from London, on the river Deben. Pop. 4640.

Wood Charcoal. See *Charcoal*.

Wood-chuck, the popular name of a rodent mammal, a species of the marmot tribe, the *Arctomys monax*, or ground-hog, common in the United States and Canada. It is of a heavy form, from 15 to 18 inches long, blackish or grizzled above and chestnut-red below. It forms burrows in which it passes the winter in a dormant state.

Woodcock, a bird of the genus *Scolopax*, the *S. rusticola*, same genus as the snipe. It is widely distributed, being found in all parts of Europe, the north of Asia, and as far east as Japan. It is a game bird of Britain, where it is known chiefly as a winter visitant, but also breeds in certain districts. The bird is about 13 inches in length, the female being somewhat larger than the male. Its food is chiefly worms. The American woodcock (*Scolopax* or *Philohela minor*) is a smaller bird, but very similar in plumage and habits.

Wood Engraving. See *Engraving*.

Wood-grouse. See *Capercaillie*.

Woodhouselee. See *Tytler*.

Wood-lark, a small species of lark, the *Alauda arborea*, not unfrequent in some parts of England, but rare in Scotland. Its song is more melodious than that of the skylark, but it does not consist of so great a variety of notes, nor is it so loud.

Woodlice. See *Slater*.

Wood-oil, a balsamic substance (an oleo-resin) obtained from several species of *Dipterocarpus* growing in Pegu, Assam, and some of the islands of the Indian Archipelago. It is used medicinally, as a varnish, in lithographic ink, &c.

Woodpecker, a name for the birds belonging to the family *Picidae*, and the order *Scansores* or climbers. They are characterized by their long, straight, angular beak, adapted for splitting the bark of trees; by their slender tongue, with its spines at the tip curved backwards to enable them to extract insects from crevices; and by their stiff tail, which acts as a prop to support them while climbing. The noise they make in tapping the bark of a tree to discover where an insect is lodged can be heard at a considerable distance. *Picus major, medius*, and *minor*, are European species, but the best known in Britain is *P. viridis*, or the green woodpecker. The first-mentioned, the great-spotted woodpecker, is coloured black and white, with a scarlet crown; length, 8 to 9 inches. In America the most characteristic species are *P. principalis* or the ivory-billed woodpecker, *P. auratus* or gold-winged woodpecker, and the Californian woodpecker (*Melanerpes formicivorus*).

Wood-pigeon. See *Ring-dove*.

Woodruff, WOODROOF, the common name of plants of the genus *Asperula*, natural order *Rubiaceæ*. The sweet woodruff (*A. odorata*), with its whorled leaves and white blossom, is found plentifully in Britain in woods and shady places. The dried leaves are used to scent clothes and also to preserve them from the attacks of insects. The root of the dyer's woodruff (*A. tinctoria*) is used instead of madder.

Woods, LAKE OF THE. See *Lake of the Woods*.

Woods and Forests, COMMISSIONERS OF, a department of the British public service to which the management of the crown lands is committed. It is under the control of the treasury, to which it transmits annual accounts of its receipts and expenditure.

Woodsia, a widely distributed genus of polypodiaceous ferns. *W. hyperborea* is one of the rarest of the British ferns, being found only on Snowdon in Wales and one or two mountains in Scotland.

Wood-sorrel, the common name of *Oxalis acetosella*, well known for the acidity of its leaves, and formerly used in medical practice as an antiscorbutic and a refrigerant.

Woodstock, a market-town, Oxfordshire, England, 8 miles N.N.W. of Oxford, on the Glyme. Near it is Blenheim Palace, the residence of the Marlborough family. Pop. 1628.—It gives name to a parl. div.

Woodstock, a city and railway centre of Canada, in Western Ontario, with manufactures of furniture, stoves, organs, &c. Pop. 10,000.—There is also a Woodstock in New Brunswick, on the St. John. Pop. 3500.

Wood-swallow, a name given in Australia to a genus of birds (*Artamus*), family *Ampelidæ* or chatterers. One species (*A. sordidus*) is remarkable for its habit of hanging suspended from dead branches in clusters resembling swarms of bees.

Woo-Hoo, or WUHU, a treaty-port of China, on the Yang-tze-kiang, about 50 miles above Nanking, opened to trade in 1877. Pop. 79,000.

Wool, that soft species of hair which grows on sheep and some other animals, as the alpaca, some species of goats, &c., which in fineness sometimes approaches to fur. Wool is divided into two classes—*short* or *carding wool*, seldom reaching over a length of 3 or 4 inches, and *long* or *combing wool*, varying in length from 4 to 8 inches, each class being subdivided into a variety of sorts, according to their fineness and soundness of the staple. Wools which unite a high degree of fineness and softness with considerable length of staple, bear a high price. English-bred sheep produce a good, strong, combing wool, that of the Scotch breeds being somewhat harsher and coarser. The finest carding wools were formerly exclusively obtained from Spain, the native country of the merino sheep, and at a later period extensively from Germany, where that breed had been successfully introduced and cultivated. Immense flocks of merinoes are now reared in Australia, South America, and South Africa, and from these quarters Britain now obtains her chief supply. The total import into the United Kingdom in 1905 of all kinds of wool, alpaca, &c., was 615,708,827 lbs., valued at over £23,821,800. Much imported wool is again exported, along

WOOLLEN MANUFACTURE.

with home-grown. The total import from Australasia was over 392,600,000 lbs. in 1905.

Woollen Manufacture. The use of wool as an article of clothing dates from the earliest times, and no doubt it was made into cloth earlier than either flax or cotton. Among the ancient Jews wool was the staple material of clothing; and the woollen fabrics of ancient Greece and Rome attained special excellence. In time the Roman manufactures were carried to the countries in which Roman colonies had been established. In England the making of woollen cloth seems to have been introduced by the Romans, but it did not rise into importance as a national employment until much later. The woollen cloths of England were for a considerable time confined to the coarser fabrics of domestic manufacture, finer cloths being imported from the Continent, particularly from Brabant. At various times also the trade was hampered by many illiberal laws for its regulation, for prohibiting exportation, &c. In the early part of the 18th century Yorkshire began to assume an important position in woollen manufactures, and this county is now the chief seat of both the English worsteds and woollens. The district of Yorkshire (West Riding) where this industry has been developed contains the towns of Leeds, Huddersfield, Halifax, Dewsbury, Bradford, and Wakefield. The west of England holds the next place to Yorkshire; and Scotland, especially the south, is famous for the sort of cloth called tweeds.

In making woollen cloth the essential processes, as carried on in modern factories, are:—(1) the *stapling* of the raw wool. In this process the stapler or sorter works at a table covered with wire netting, through which the dirt falls while the various qualities of wool are being separated. The wool is then ready to be put through the (2) *scouring* machine, where it passes on an endless apron into an oblong vat, which contains a steaming soapy solution. Here it is carried forward gently by means of rakes until it is thoroughly soaked and cleansed. After this it is taken to the (3) *drying* framework of wire netting, under which are situated steam-heated pipes. A fan-blast drives the heated air upwards through the wet wool, which lies on the wire netting, until it is all equally dried. When necessary this is the point in the process when it is 'dyed in the wool.' It is then ready for the (4) *willeying* or *teasing* machine, which consists of a revol-

ving drum furnished with hooked teeth, close above which are set cylinders with hooked teeth moving in a contrary direction. The wool is fed in upon the drum, which whirls with great speed; and between the two sets of teeth working in opposite directions it is disentangled, torn, and cast out in fine, free fibres. With some classes of wool it is also necessary, at this stage, to remove suds and burrs by steeping them in a solution of sulphuric acid, or passing them through a burring machine, by which the burrs are extracted. The wool is now dry and brittle; and before submitting it to the process (5) of *carding*, it is sprinkled with oil and well beaten with staves in order to give it suppleness. This process of carding is accomplished by a series of three delicate and complex machines called a scribbler, an intermediate, and a finisher. These machines have various intricate cylinders and rollers, studded with teeth and working in opposite directions, over which the wool is passed until it is torn, interblended, and finally delivered from the finisher in a continuous flat lap. It is then cut into strips and passed (6) to the *condensing* machine, which rubs the strip into a soft, loose cord or sliver technically called a 'slubbing.' The wool is now ready for (7) *spinning* into yarn, and this is accomplished in a wool-spinning mule, which draws and twists the sliver into the required thinness, the process being essentially the same as in cotton-spinning. (See *Cotton-spinning*.) The wool, which has thus been brought into the form of yarn, is now fit for (8) *weaving* into woollen cloth. (See *Weaving*.) When it is taken out of the loom the cloth is washed, to free it from oil and other impurities, and also beaten while it lies in the water by wooden hammers moved by machinery, while it is again dyed if found necessary. After it has been scoured in water mixed with fuller's earth, the cloth undergoes a process of (9) *teaseling* and *shearing* (see *Teasel*), in which the pile or nap is first raised, and then cut to the proper length by machines. When this is done it is (10) steamed and pressed between polished iron plates in a hydraulic press.

In the manufacture of worsted yarn the long-staple wool fibres are brought as far as possible into a parallel condition by processes called *gilling* and *combing*. The wool, in a damp condition, is passed through a series of 'gill boxes,' in which steel gills or combs separate and straighten the fibres until, from the last box, it issues in a long

sliver. In this condition it is run through a delicate combing machine. From the combing machine it is delivered in the condition of a fine sliver technically called *top*, and after being further attenuated by a process of roving the thread is spun into yarn.

The value of woollen and worsted yarns exported from the U. Kingdom in 1907 was £8,569,994 (besides £2,962,893 for *tops*); the value of woollen and worsted fabrics amounted to £22,151,174.

Woolner, THOMAS, sculptor, was born at Hadleigh, Suffolk, 1825; educated at Ipswich; placed at the age of thirteen in the studio of William Behnes; exhibited his first notable life-size group, *The Death of Boadicea* (1844); and followed up this success with *Puck*, *Titania*, and *Eros* and *Euphrosyne*. Besides his well-known statues of Carlyle, Tennyson, Gladstone, Newman, Darwin, Kingsley, &c., his more celebrated works are: *Elaine with the Shield of Sir Lancelot*, *Ophelia*, *In Memoriam*, *Virgilia Bewailing the Banishment of Coriolanus*, and *Achilles and Pallas shouting from the Trenches*. He was elected an A.R.A. 1871; R.A. in 1876. He has also achieved considerable success as a poet in the volumes entitled *My Beautiful Lady* (1863), *Pygmalion* (1884), *Silenus* (1884), and *Tiresias* (1886). He died in 1892.

Woolsack, a large square bag of wool, without back or arms, covered with red cloth, which forms the seat of the lord chancellor of England in his capacity of speaker of the House of Lords.

Wool-tree. See *Eriodendron*.

Woolwich (wyl'ich), a metropolitan municipal and parliamentary borough of England, on the Thames, 8 miles below London Bridge. It stretches about 3 miles along the south bank of the river, and owes its importance to the great arsenal, which has a circumference of 4 miles, and comprises gun and carriage factories, forges, foundries, workshops, laboratory, barracks, &c., with vast magazines of warlike stores. North Woolwich, with various industries, on the north side of the river, is connected by steam ferry. The parl. bor. sends one member to parliament. Pop. 117,178.

Woonsocket, a town of the United States, Providence county, Rhode Island, about 40 miles s.w. of Boston. Its manufacturing establishments include cotton and woollen factories, machine-shops, rubber-works, iron-foundries, &c. Pop. 28,204.

Woorali Poison. See *Curari*.

Wootz, a very superior kind of steel made in the East Indies, it is believed by a process direct from the ore, and imported into Europe and America for making the finest classes of edge-tools.

Worcester (wurs'ter), capital of Worcestershire, and one of the most ancient cities in England, on the eastern bank of the Severn, 114 miles n.w. of London. Its most notable building is a Gothic cathedral, originally built in 680 and rebuilt in the beginning of the 13th century. Constructed in the form of a double cross, with a central tower, it has been added to at various periods, and a very complete restoration was lately made. Among other buildings are the shire hall, the guildhall, corn exchange, museum of natural history, &c. Worcester is the chief seat of the English leather glove trade, has celebrated porcelain works, sauce works, foundries, carriage factories, and other works. It sends one member to parliament. Pop. of county and parl. bor., 46,623. The county is bounded n. by Shropshire and Staffordshire, e. by Warwickshire, s. by Gloucestershire, and w. by Herefordshire; area, 480,128 acres, about half of which is in permanent pasture. The surface is a broad plain varied by the Malvern Hills in the s.w., several valleys, of which the Severn is the most notable, and having as its chief rivers the Severn, Stour, Teme, and Avon. The soil, which is mostly of clay, is well adapted for wheat, which is extensively grown, while hop gardens are numerous. Coal and iron are worked in the Dudley district; there are large manufactures of iron, steel, and hardware; and salt is obtained abundantly from the salt springs at Droitwich. The carpets of Kidderminster are famous, as are also the gloves and porcelain of Worcester, and there are important glass manufactures at Dudley and Stourbridge. For parliamentary purposes the county is divided into five divisions, each of which returns one member. Pop. 488,401.

Worcester, a town of the United States, in Massachusetts, about 40 miles west of Boston. It is situated in a fertile agricultural district, and is considered one of the finest towns in New England. It has manufactures of iron goods of various kinds, including machinery, tools, &c.; also of woollens, carpets, boots and shoes, leather, paper, musical instruments, &c. Pop. 118,421.

Worcester, EDWARD SOMERSET, MARQUIS OF, one of the earliest inventors of a steam-engine, was born about 1601, and died 1667.

He was engaged in the service of Charles I. during the civil war, and was imprisoned in the Tower from 1652-55. He afterwards spent his time in retirement, and in 1663 published a book entitled the *Scantlings of One Hundred Inventions*, in which he first gave a description of the uses and effects of his steam-engine.

Worcester College, OXFORD, originally called Gloucester Hall, was founded in 1714 by Sir Thomas Cookes of Bentley, Worcestershire.

Wordsworth, CHRISTOPHER, D.D., youngest brother of the poet, born at Cockermouth 1774, died 1846. Educated at Trinity College, Cambridge, he took orders, and after filling several ecclesiastical posts became in 1820 master of Trinity College. He is the author of *Ecclesiastical Biography* and other works.—His son, CHRISTOPHER WORDSWORTH, D.D., born 1807, died 1885, was head-master of Harrow School 1836-44, and in 1869 became bishop of Lincoln.—His brother, CHARLES WORDSWORTH, D.D., D.C.L., born 1806, educated at Oxford, became second master of Winchester College (1835-45), warden of Trinity College, Glenalmond (1846-52), and Bishop of St. Andrews, Dunkeld, and Dunblane. He died in 1892. Most of his writings are theological.—JOHN WORDSWORTH, D.D., son of the Bishop of Lincoln (see above), born 1843, became Bishop of Salisbury in 1885.

Wordsworth, WILLIAM, English poet, son of an attorney, was born at Cockermouth, Cumberland, 7th April, 1770, and died 23d April, 1850. In 1787 he was sent to St. John's College, Cambridge. He left the university after taking his degree, but without having otherwise distinguished himself, and lived aimlessly in London and elsewhere. He crossed to France in Nov. 1791, and exhibited vehement sympathy with the revolution, remaining in France for nearly a year. After his return, disregarding all entreaties to enter upon a professional career, he published his *Evening Walk and Descriptive Sketches* (1793). Two years afterwards he received a legacy of £900 from Raisley Calvert, a friend whom he had nursed in his last illness. With this sum and the consecrated helpfulness of his sister Dorothy he contrived to keep house for eight years, while he gave himself to poetic effort as his high 'office upon earth.' For the first two years they lived at Race-down in Dorset, where the poet among other experiments began his tragedy of *The Bor-*

derers. In this retreat they were visited (1797) by Coleridge, who had already recognized an original poetic genius in the author of *Descriptive Sketches*. Coleridge was at this time living at Nether Stowey, in Somerset, and during this visit he induced the Wordsworths to go into residence at Alfoxden, in his immediate neighbourhood. Here the two poets held daily intercourse, and after a twelvemonth they published *Lyrical Ballads* (1798) in literary copartnership. Although this volume was received with almost complete public indifference, yet Wordsworth felt that he had found his mission, and after a winter spent in Germany he and his sister settled at Grasmere (1799), where he proposed to write a great philosophical poem on man, nature, and society. Thenceforth his life was marked by few incidents. Those worth noting are his marriage in 1802 with his cousin Mary Hutchinson; a removal from Grasmere to Allan Bank in 1808; his appointment in 1813 to an inspectorship of stamps, and his removal to Rydal Mount; several journeys into Scotland and to the Continent; his acceptance of a D.C.L. degree conferred upon him in 1839 by the University of Oxford; and his accession in 1843 to the laureateship on the death of Southey. Wordsworth's great philosophic poem, which, in his own phrase, was to be the Gothic cathedral of his labour, received only a fragmentary accomplishment in *The Prelude*, *The Excursion*, and *The Recluse*. Yet enough was achieved in his smaller poems to justify his own conception of himself as a 'dedicated spirit,' and to set him apart among the greatest of England's poets. More than one complete edition of his poetical works have recently been published, his prose writings have been collected and published by Dr. Grosart, his *Memoirs* were published in 1851 by his nephew, and an interesting account of the poet and his sister Dorothy is found in her *Diary of a Tour in the Highlands*.

Work, in mechanics, the act of producing a change of configuration in a system in opposition to a force which resists that change. By English physicists a *unit of work* is taken as a weight of one pound lifted one foot. See *Foot-pound*, *Unit*, *Energy*.

Workhouse, a house in which paupers are maintained at the public expense, those who are able-bodied being compelled to work. Under the old poor-laws of England, there was a workhouse in each parish, partaking

of the character of a bridewell, where indigent, vagrant, and idle people were set to work, and supplied with food and clothing, or what is termed *indoor relief*. These workhouses were described as, generally speaking, nurseries of idleness, ignorance, and vice; but a new system was introduced in 1834, parishes being now united for the better management of workhouses, which gave rise to the poor-law unions, with their workhouses. In these establishments the pauper inmates are employed according to their capacity and ability. Religious and secular instruction is supplied, while habits of industry, cleanliness, and order are enforced. See *Poor*.

Workington, a market-town and seaport of England, county of Cumberland, near the mouth of the Derwent, about 6 miles N. of Whitehaven. Its industrial establishments comprise large iron-smelting works and works for steel rails, iron-plates, ship-building, &c., while there is a considerable shipping trade. Pop. 26,141.

Works and Public Buildings, BOARD OF, in Britain, a department of the public service under the control of the Treasury, having the charge of all public works and buildings undertaken or maintained at the expense of the revenues of the state.

Workshop and Factory Regulations. See *Factory Acts*.

Worksoy, a market-town of England, in Nottinghamshire, 26 miles N. of Nottingham. It has a beautiful Norman church, and iron-foundries, saw-mills, and chemical works. Pop. 16,112.

Worms, a term loosely applied to many small longish creeping animals, entirely wanting feet or having but very short ones, including such various forms as the earth-worm, the larvæ or grubs of certain insects, intestinal parasites, as the tape-worm, thread-worm, &c. In zoological classifications it is used as equivalent to *Vermes* or to *Annelida*. In medicine it is applied to the parasitic animals which exist chiefly in the intestines, and to the disease due to the presence of such parasites. Several kinds of worms may infest the human body, but the worms with which children are so commonly annoyed are the small worms known as thread-worms. Vermifuges or anthelmintics are names given to medicines that cure worms, such as extract of male-fern root for tape-worms, santonin for thread-worms. See *Worm-seed*, *Wormwood*, *Tape-worm* and *Nematelmia*.

Worms, a town of Germany, in the Grand-duchy of Hesse, on the Rhine, 25 miles S. of Mainz, and 20 miles N.W. of Heidelberg. The chief buildings of interest are the Romanesque cathedral (12th century), a magnificent structure with four round towers and two large domes; the Liebfrauenkirche and church of St. Martin; the town-house; and the monument to Luther, consisting of a colossal statue on a raised platform surrounded by figures of precursors of or persons directly connected with the Reformation. At Worms was held the famous diet in 1521, at which Luther defended his doctrines before the Emperor Charles and an august assemblage. Pop. 43,800.

Worm-seed, a seed which has the property of expelling worms from the intestinal tube or other open cavities of the body. It is brought from the Levant, and is the produce of a species of *Artemisia* (*A. Santonica*), which is a native of Tartary and Persia. In the United States the name is generally given to the seed of *Chenopodium anthelminticum*. See *Santonin* and *Erysimum*.

Wormwood, the common name of several plants of the genus *Artemisia*. Common wormwood (*A. Absinthium*), a well-known plant, is celebrated for its intensely bitter tonic and stimulating qualities, which have caused it to be an ingredient in various medicinal preparations, and even in the preparation of liqueurs. It is also useful in destroying worms in children.

Worsted, a variety of woollen yarn or thread, spun from long-staple or other wool, which has been combed, and in which the fibres all receive a more or less parallel direction. It is woven into various fabrics, knitted into stockings, &c. The name is from Worsted, a village in Norfolk where it is supposed to have been first manufactured. See *Woollen Manufacture*.

Wort. See *Brewing*.

Worthing, a watering-place in England, county of Sussex, about 10 miles west of Brighton. It is a fashionable resort, having an esplanade, libraries, a literary institution, reading-rooms, &c. There is also an extensive mackerel-fishery. Pop. 22,567.

Wotton, SIR HENRY, a diplomatist and miscellaneous writer, born 1563, died 1639. He was educated at Winchester and Oxford; resided on the Continent for some years, and on returning to England was employed as secretary to Essex. On the fall of that nobleman from power (1600) Wotton fled to Florence, where he was employed by the

grand-duke to reveal to King James of Scotland a plot against his life. When the Scottish king ascended the throne of England he showed his gratitude by making Wotton a knight, employing him abroad as an ambassador, and ultimately (1625) appointing him provost of Eton. His ability as a writer is shown in *Reliquiæ Wottonianæ*, published in 1651, with Izaak Walton's *Life of Wotton*.

Wound, in surgical phrase, a solution of continuity in any of the soft parts of the body occasioned by external violence, and attended with a greater or less amount of bleeding. Wounds have been classified as follows: (a) *Cuts, incisions, or incised wounds*, which are produced by sharp-edged instruments. (b) *Stabs or punctured wounds*, made by the thrusts of pointed weapons. (c) *Contused wounds*, produced by the violent application of hard, blunt, obtuse bodies to the soft parts. (d) *Lacerated wounds*, in which there is tearing or laceration, as by some rough instrument. (e) All those common injuries called *gunshot wounds*. (f) *Poisoned wounds*, those complicated with the introduction of some poison or venom into the part.

• **Wourali Poison**. See *Curari*.

Wouverman (vou'vër-mân), PHILIP, Dutch painter, born 1620, died 1668. He was the son of Paul Wouverman, a historical painter, who taught him the rudiments of the art. The subjects in which he excelled were huntings, hawkings, encampments of armies, farriers' shops, and all such scenes as admitted the treatment of horses and other animals.

Wrack, or SEA-WRACK, a popular name for sea-weed cast ashore by the waves, but sometimes applied specifically to the genus *Fucus*, of which *F. vesiculosus* and *F. nodosus* are most plentiful upon the British shores. See *Fucaceæ*.

Wrangler, in Cambridge University, the name given to those who have attained the first class in the public examination for honours in mathematics, commonly called the *mathematical tripos*. The distinction of wranglers into *first or senior*, *second*, &c., was abolished in 1907.

Wrasse (ras), the name of various species of fish belonging to the family Labridæ. They are prickly-spined, hard-boned fishes, with large double and fleshy lips. Several species are natives of the British seas, as the ballan wrasse, or old wife (*Labrus tinca* or *maculatus*), which attains a length of about 18 inches.

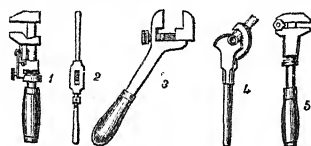
Wreck, in law, a wrecked vessel or part of it, or of its cargo, including articles of value cast upon land by the sea, and also jetsam, flotsam, ligan, and derelict. The law on the subject of wrecks is contained in the recent Merchant Shipping Acts. The wreck is taken over by the *receiver of wrecks* for the district in which it is discovered, and kept by such authority for a year, at which time, if no one has established his claim to possession, it becomes the property of the crown. Should the wreck be of a perishable nature it can be sold and the proceeds retained instead. Any person found stealing or destroying wreck is chargeable with felony; and a person proved to be in possession of shipwrecked goods, or who offers such goods for sale, may be fined or imprisoned. In the case of plunder or damage to any ship or boat cast ashore, the owner may claim compensation from the district authority.

Wren, a name given to certain birds closely allied to the warblers, distinguished by their small size, slender beak, short, rounded wings, mottled plumage, and the habit of holding the tail erect. The wren proper (*Troglodytes vulgaris*) is, with the exception of the golden-crested wren, the smallest bird in Europe, averaging about 4 inches in length. It is a well-known bird, and has rather a bold loud song. The American house-wren (*T. domesticus*) is a very familiar bird, and a general favourite in America.

Wren, SIR CHRISTOPHER, English architect, born in 1631, died in 1723. He was educated at Wadham College, Oxford; became a fellow of All Souls in 1653; was appointed professor of astronomy at Gresham College in 1657, and three years afterwards was elected Savilian professor of astronomy at Oxford. He had been appointed by Charles II. to restore old St. Paul's, but after the great fire (1666) it became necessary to rebuild the cathedral. In preparing his plans he was considerably hampered by the ecclesiastical authority, but with the king's permission he modified and improved the design as the building proceeded. Thus, the division of the exterior into two orders of columns, and the present dome and drum on which it stands, were alterations on the original plan. The cathedral was begun in 1675, and the architect saw the last stone laid by his son thirty-five years afterwards. Among the other notable buildings which Wren de-

signed are: the modern part of the palace at Hampton Court, the library of Trinity College, Cambridge, the hospitals of Chelsea and Greenwich, the churches of St. Stephen's, Walbrook; St. Mary-le-bow; St. Michael, Cornhill; St. Bride, Fleet Street; as also the campanile of Christ Church, Oxford. In 1680 he was chosen president of the Royal Society, appointed in 1708 surveyor of the royal works, and from 1685 to 1700 represented various boroughs in parliament. Over the north doorway of St. Paul's is a memorial tablet on which are the well-known words: *Si monumentum requiris, circumspice*. See *Paul's, St.*

Wrench, an instrument consisting essentially of a bar of metal having jaws adapted to catch upon the head of a bolt or a nut to



Wrenches.
1. Screw-wrench. 2. Tap-wrench.
3. Angle-wrench. 4. Tube-wrench.
5. Monkey-wrench for hexagonal and square nuts.

turn it; a screw-key. Some wrenches have a variety of jaws to suit different sizes and shapes of nuts and bolts, and others, as the monkey-wrench, have an adjustable inner jaw.

Wrexham (reks'am), a municipal and parliamentary borough of North Wales, county of Denbigh, 12 miles south of Chester. Its church of St. Giles, built about 1470, is one of the finest old Gothic buildings in North Wales. The town has large breweries, tanneries, paper-mills, &c., and there are extensive coal-mines in the neighborhood. Wrexham is one of the Denbigh boroughs. The population of the municipal borough is 14,966.

Wrist. See *Hand*.

Writ, in law, a precept under seal in the name of the sovereign, a judge, or other person having jurisdiction, and directed to some public officer or private person, commanding him to do a certain act therein specified. Writs in English law were formerly very multifarious, but a great number have been abolished. One of the most important is the writ to the sheriff of a county to elect a member or members of parliament.

Writer's Cramp, a spasmodic affection in which the patient loses complete control

over the muscles of the thumb and the fore and middle finger, so that all attempts to write regularly, and in the severer cases even legibly, are unsuccessful. The various methods of treatment for this trouble (such as surgical operations, the application of electricity, &c.) have not produced very satisfactory results. Called also *Scriveners Palsy*.

Writers to the Signet. See *Signet*.

Writing, one of the oldest arts, is usually divided into *ideographic writing*, in which signs represent ideas, and into *phonetic writing*, in which signs represent sounds. Ideographic writing, in its earliest form, is supposed to have been an attempt to convey ideas by copying objects direct from nature, and this form of it has thus acquired the name of *picture-writing*. After this came symbolical writing, in which abbreviated pictures were used as arbitrary symbols, first of things, and still later of sounds and words. This indicates the transition into phonetic writing, in which the signs may either represent a whole syllable (*syllabic writing*), or only a single sound, in which case they are called *alphabetic*. These signs differ in form and use in the various alphabets. Thus the Chinese signs are read in columns from top to bottom, the Mexican picture writing from bottom to top, the Hebrew writing from right to left, and Latin, Greek, and all European languages as well as Sanskrit from left to right. (See *Alphabet*.) In the Chinese system of writing there is no alphabet, the characters being syllabic and strictly ideographic.

Writing was introduced to the western nations by the Phenicians, and the Phenician system was based on the Egyptian. The cuneiform writing, another ancient system, invented by the Accadian inhabitants of Chaldea, was also adapted to several languages, as the Assyrian, the Persian, &c., in a variety of ways, ideographic, syllabic, and alphabetic (see *Cuneiform Writing*). Also of independent origin is the Chinese system. The Egyptians had three distinct kinds of writing, the hieroglyphic, the hieratic, and the enchorial or demotic (see *Hieroglyphic*), and it was from the second that the Phenician and other Semitic systems of writing was derived. The leading Semitic forms are the Samaritan or ancient Hebrew, the Chaldee or East-Aramaic, the Syriac or West-Aramaic, the Kufic or early Arabic, and the Neshki or modern Arabic. At what time writing was introduced into ancient Greece

is not known with certainty, but probably it was employed by the 10th century B.C. From Greece it passed to Sicily and Italy, and thence it was spread as Christianity spread. Like the Semites the Greeks originally wrote from right to left. In mediæval manuscripts a variety of styles were adopted in different epochs and countries. Capitals were not then used as now to distinguish prominent words, but whole manuscripts were written in large or small capitals. Uncial letters, which prevailed from the 7th to the 10th centuries, were rounded capitals with few hair-strokes. Gothic characters, which were merely fanciful deviations from the Roman types, became common in inscriptions from the 13th to the 15th centuries, and were employed in church books from the time of St. Louis. In England a variety of styles called Saxon prevailed in the early middle ages. A mixed style was formed of a combination of Roman, Lombardic and Saxon characters; the Norman style came in with William the Conqueror; and the English court hand, an adaptation of Saxon, prevailed from the 16th century to the reign of George II. There have been various attempts made to introduce systems of *phonetic writing*, in which each sound should be represented by one invariable sign. Systems of shorthand writing are generally phonetic. See *Manuscripts, Shorthand*.

Wryneck, a bird allied to and resembling the woodpeckers. One species, the common wryneck (*Yunx torquilla*), is a summer visitant of England and the north of Europe. It is remarkable for its long tongue, its power of protruding and retracting it, and the writhing snake-like motion which it can impart to its neck without moving the rest of the body. It feeds chiefly on insects.

Wuhu. See *Woo-Hoo*.

Württemberg (vür'tem-berh), or WÜRTTEMBERG, a kingdom of the German Empire, between Bavaria, Baden, Hohenzollern, and the Lake of Constance, which separates it from Switzerland; area, 7531 sq. miles; pop. 2,300,330. Except a few tracts in the south, the surface is hilly and even mountainous. In the west the Schwarzwald, or Black Forest (which see), forms part of the boundary, and the Alb or Rauhe Alp, forming part of the Franconian Jura, covers an extensive tract. The country belongs in large part to the basin of the Rhine, being drained northward into that river by the Neckar, while the Danube flows across the southern districts. A part of the Lake of Constance is

also included in Württemberg. The climate is decidedly temperate. In the lower and more favourable districts the fig and melon ripen in the open air, and the vine, cultivated on an extensive scale, produces several first-class wines; maize, wheat, hops, tobacco, and fruit, which is employed in cider making, are largely cultivated. About a third of the country is under forests, which consist chiefly of oaks, beeches, and pine. Of minerals, by far the most valuable are iron and salt, both of which are worked by the government; the others are limestone, gypsum, alabaster, slate, mill-stones, and potter's-clay. The manufactures consist chiefly of cotton, woollen, and linen goods, paper, wooden clocks, toys, musical instruments, and chemical products. The government is an hereditary constitutional monarchy, the executive power being lodged in the sovereign, and the legislative jointly in the sovereign and a parliament, composed of an upper and a lower chamber. The latter, which is elected every six years, is composed of ninety-three members. The yearly revenue from all sources is about £4,000,000, and the public debt, the bulk of which was incurred in constructing the state railways, is about £28,000,000. In the Bundesrath Württemberg is represented by four members, and in the Reichstag by seventeen. There is no exclusively established religion, but the king is invested by the constitution with the supreme direction and guardianship of the evangelical Protestant Church. Education is generally diffused, and the centre of the educational system is the University of Tübingen. Besides Stuttgart (the capital), the chief towns are Ulm, Heilbronn, and Esslingen. The history of the state is of little general interest. Previous to the Napoleonic era the rulers had the title of duke, but in 1806, by the favour of Napoleon, the then duke gained a great accession of territory, as well as the title of king. In the subsequent arrangement of the European states by the Congress of Vienna the territorial accessions were confirmed and the kingly title formally recognized. In the war of 1866 Württemberg sided with Austria against Prussia. It became a member of the German Empire on its foundation in 1871.

Würzburg (vürts'burh), a town in the north-west of Bavaria, on the Main, 60 miles S.E. of Frankfort. Its old fortifications have been demolished, and the site laid out in fine promenades, but it is still over-

looked by the fortress of Marienberg, on a lofty hill outside the city. The most important edifices are the Romanesque cathedral, erected in the 10th century, with an interior highly enriched but much deteriorated by plaster decoration of the 18th century; the university, with various new buildings; the Julius hospital and school of medicine, and the royal palace (1720-44). The university library has 200,000 volumes, and in other respects the university, especially in the medical faculty, is well equipped. The manufactures are varied in character. Pop. 80,327.

Wurzen (wurt'sén), an old town of Germany, in Saxony, on the Mulde, with a cathedral, ancient castle, and important industries. Pop. 17,212.

Wyandots (in Canada called *Hurons*), an Indian tribe in North America belonging to the Iroquois family. In the beginning of the 17th century they were settled on the eastern shore of Lake Huron, but in a tribal war (1636) they were nearly exterminated by the Iroquois. The tribe then suffered various vicissitudes. In 1812 a number of their warriors fought on the side of the British. Latterly a small number got a reservation in the Indian Territory, but they are now very few in numbers.

Wyandotte Cave, situated 5 miles N. of Leavenworth, Indiana, has been explored for over 20 miles, and rivals the Mammoth Cave in the size of some of its chambers and in its stalagmites and stalactites.

Wyatt, **SIR MATTHEW DIGBY**, English architect and writer on art, born 1820, died 1877. He was connected with the great exhibition of 1851 as secretary to the commissioners, was knighted in 1869, and appointed Slade professor of fine arts at Cambridge.

Wyatt, **SIR THOMAS**, the first writer of sonnets in the English language, born in 1503, died 1542. He commenced his academical education at Cambridge and completed it at Oxford. On quitting the university he travelled on the Continent, and on his return appeared at court, where he was favoured by Henry VIII., who employed him on several diplomatic missions. His poetical works, which include elegies, odes, and a metrical translation of the Psalms, were published in 1557, along with those of his friend the Earl of Surrey.

Wych-elm. See *Elm*.

Wycherley, **WILLIAM**, an English dramatist, born about 1640 at Clive, near Shrewsbury; died 1715. His early years were

spent in France, afterwards he was educated at Oxford, and entered himself at the Temple; while in 1670 he became known as a fashionable man about town and the author of *Love in a Wood*. This comedy was followed by the *Gentleman Dancing Master*, the *Country Wife*, and the *Plain Dealer*. In 1680 he married the Countess of Drogheda, a young, rich widow, who at her death left him a lawsuit, the expenses connected with which brought him to the Fleet Prison. Here he remained for seven years, until released and pensioned by James II. Wycherley is the typical dramatist of the Restoration group, in which all the brilliancy and dissoluteness of that school are very prominent.

Wych-hazel, the common name of plants of the genus *Hamamelis*, the type of the natural order Hamamelidaceæ. They are small trees, with alternate leaves on short petioles, and yellow flowers disposed in clusters in the axils of the leaves, and surrounded by a three-leaved involucre. They are natives of North America, Persia, or China, and are very different from the true hazel. The Virginian wych-hazel is medicinally important. See *Hazel*.

Wycliffe. See *Wickliff*.

Wycombe, **HIGH OR CHEPPING**, a municipal borough of England, in Buckinghamshire, on the Wye, giving name to a par. div. Its chief building is the church of All Saints, built about 1273 A.D., and its chief industry is chair-making. Pop. 15,542.

Wye, a river of South Wales, which rises on Plynlimmon, in Montgomeryshire, passes through Radnorshire, Brecknockshire, and Herefordshire, and falls into the Severn, after a course of 130 miles, near Chepstow, in Monmouthshire. Above the latter place it is only navigable by barges.

Wykeham, **WILLIAM OF**, was born at Wykeham, Hampshire, in 1324, died 1404. He received a liberal education from the lord of the manor of Wykeham, and was afterwards recommended by him to the notice of Edward III. Having taken holy orders he was elevated to the rich see of Winchester, and in 1367 was appointed to the chancellorship of England. He founded (1387) the famous public school or college at Winchester, and about the same time a college at Oxford, now called New College. In the last years of his life he rebuilt Winchester Cathedral.

Wyntoun, **ANDREW**, an ancient rhyming chronicler of Scotland, who lived in the early

WYOMING — XEBEC.

part of the 15th century, was a canon regular of St. Andrews, as also prior of St. Serf's Inch, in Lochleven. His Chronicle, which is in the Scottish vernacular, and is called the Orygynale Cronykil of Scotland, begins with the creation of the world, and is brought down to the death of Robert III. in 1406. The first five books contain an outline of general history and geography; the four remaining books dealing with Scotland.

Wyo'ming, one of the United States of America (admitted June, 1890). It is almost rectangular in shape, situated N. of Utah and Colorado, W. of Nebraska and S. Dakota, and S. of Montana; area, 97,890 square miles. The surface is to a large extent mountainous, the main chain of the Rocky Mountains extending from north-west to south-east. The river system includes the Platte River with its tributaries in the south-east, the Green River in the south-west, and the Yellowstone, Big Horn, and Powder rivers in the north. The mountainous districts abound in forests, and the

soil of the valleys is a fertile loam very suitable for agriculture. Wheat, oats, and barley are the chief crops, and large tracts are used for stock-raising. The climate is arid, and the rainfall so precarious that irrigation has to be adopted on the arable lands. The chief minerals are gold, silver, copper, tin, iron, petroleum, and coal, the last now extensively mined. Of the larger animals grizzly and black bears and several species of deer are still abundant, but the buffalo, of which there used to be immense herds on the plains, are now nearly extinct. Acquired by purchase from France, this territory was organized in 1868, and is now being slowly developed, chiefly through means of the Union Pacific Railway, by which it is traversed. In the north-west the Yellowstone district has been set apart by the government as a great national park. The capital is Cheyenne City. Pop. in 1880, 20,789; in 1900, 92,351.

Wyvern, a heraldic monster not unlike a dragon, but with two eagle's legs.

X.

X, the twenty-fourth letter of the English alphabet. Except when used at the beginning of a word, *x* in English is a double consonant, and has usually the sound of *ks*, as in *vax*, *lax*, *axis*, &c.; but when terminating a syllable, especially an initial syllable, if the syllable following it is open or accented, it often takes the sound of *gz*, as in *luxury*, *exhaust*, *exalt*, *exotic*, &c. At the beginning of a word it has precisely the sound of *z*.

Xanthippe. See *Socrates*.

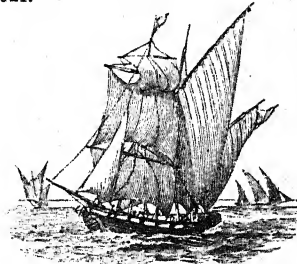
Xanthorrhoea. See *Grass-trec*.

Xanthoxylum. See *Prickly Ash*.

Xanthus, an ancient city of Asia Minor, in Lycia, on the river Xanthus, about 8 miles above its mouth. Its ruins were discovered in 1838 by Sir C. Fellows; and have yielded a large collection of marbles, now in the British Museum. The river rises in Mount Taurus, and falls into the Mediterranean a little to the west of Patara.

Xavier, St. FRANCIS (zav'i-ér; Spanish pron. häv-i-er'), surnamed the *apostle of the Indies*, was born in 1506 at the castle of Xavier in Navarre. He fell under the personal influence of Ignatius Loyola, and became one of the first members of Loyola's Society of Jesus. Having been appointed

papal nuncio in the Indies, in 1542 he reached Goa, where, and in other parts of India, notably in Travancore, he prosecuted with success his missionary labours. After proselytizing at Ceylon, at Malacca, and in the Moluccas, he visited Japan, where he established a promising mission. In 1552 he started for China in the hope of converting it to Roman Catholic Christianity, but died in 1552, when at no great distance from Canton. He was canonized in 1621.



Xebec of Barbary.

Xebec, a three-masted vessel, formerly much used by the Algerine corsairs, and

still to a small extent employed in Mediterranean commerce. It differs from the felucca chiefly in having several square sails, as well as lateen sails, while the latter has only lateen sails.

Xenia, a town of the U. States, capital of Greene county, Ohio, on Shawnee Creek, 65 miles N.E. of Cincinnati, and the seat of various industries. Pop. about 10,000.

Xenocrates, of Chalcedon, Greek philosopher, a disciple of Plato, born 396 B.C., and from 339 until his death, 314 B.C., head of the famous Academy at Athens. Metaphysics and ethics were his chief subjects, but of his numerous works only the titles are now known.

Xenophanes, of Colophon, Greek philosopher, born probably about 330 B.C., for some time settled at Elea, and regarded as the founder of the Eleatic school of philosophy. The character of his teaching has been much debated. He must have been at least seventy-two when he died. See *Eleatic School*.

Xenophon, the Greek historian and essayist, born at Athens about 430 B.C.; became early a disciple of Socrates. In 401 B.C., partly from curiosity, and in no military capacity, he joined the Greek mercenaries attached to the force led by Cyrus the Younger against his brother Artaxerxes II. After the defeat and death of Cyrus on the field of Cunaxa, the chief Greek officers were treacherously assassinated by the victorious satrap. Xenophon now came to the front, and mainly conducted the famous retreat of the 10,000 through wild and mountainous regions, often harassed by the guerrilla attacks of barbarous tribes, until after a five months' march they reached Trebizond on the Black Sea, February 400 B.C. The expedition and its sequel form the subject of his best-known work, the *Anabasis*. Xenophon fought on the side of the Lacedaemonians in the subsequent war between Sparta and Persia, and rose from poverty to competence through the ransom which he received from a wealthy Persian nobleman whom he had captured. With Agesilaus, under whom he had already served, he fought at Coroneia (394 B.C.) against his own countrymen, and was on this account formally banished from Athens. For more than twenty years he seems to have lived the life of a country gentleman at Scyllus in Elis, where he is supposed to have written most of his works. After the defeat of the Spartans at Leuctra (371 B.C.), Xenophon

was driven from Elis, and is said to have retired to Corinth. He was certainly alive in 357 B.C. Xenophon's principal works, besides the *Anabasis*, are his *Cyropædia*, a political and educational romance based on the history of Cyrus the Great; the *Hellenica*, a history of Greece where Thucydides leaves off, from 411 to 362 B.C.; and the *Memorabilia*, recollections of Socrates.

Xeres. See *Jerez*.

Xerxes I., King of Persia, famous for his unsuccessful attempt to conquer Greece, was the son of Darius and of Atossa, daughter of Cyrus. He began to reign 485 B.C., and continued his father's preparations for another Persian invasion of Greece. The army which he collected must on the soberest estimate have exceeded a million of men, with a fleet of 1200 sail. Xerxes crossed the Hellespont (480 B.C.), and met with no resistance until he reached the Pass of Thermopylae. After Leonidas had fallen there with his Spartans (see *Leonidas*), Xerxes pressed forward and burned Athens, which had been forsaken by almost all its inhabitants. He watched from the mainland the naval battle of Salamis (September, 480 B.C.), and fled ignominiously after the overwhelming defeat of his fleet. Xerxes was assassinated 465 B.C. He has been supposed to be the Ahasuerus of the Book of Esther.

Ximenes (*hi-mā'nes*), FRANCISCO, Spanish cardinal, born in 1437, died in 1517. In 1492 he was appointed confessor to Queen Isabella of Castile, and in 1495 Archbishop of Toledo, distinguishing himself as a reformer of ecclesiastical and monastic abuses. In 1507 he was made a cardinal, and in 1509 he accompanied an expedition, fitted out at his own expense, which captured the Moorish city of Oran. In 1516 King Ferdinand died, leaving Ximenes regent during his grandson Charles's absence in the Netherlands. In 1517 Charles returned to Spain, and, prompted by jealousy of the power of Ximenes, dismissed him. Ximenes died almost immediately afterwards. He founded and endowed the University of Alcalá de Henares, and is said to have expended half a million of ducats on the famous Complutensian Polyglot. See *Complutensian Polyglot*.

Xingu (*shing-gō'*), a river of Brazil, one of the chief tributaries of the Amazon, rises near lat. 15° S., lon. 59° W., and after flowing north for 1800 miles joins the Amazon 240 miles W. of Pará. Steamers can ascend it for 100 miles.

Xiphias. See *Sword-fish*.
Xiphodon (zi'f'o-don), a genus of fossil mammals closely allied to *Anoplotherium*.

Xyloc'opa. See *Carpenter-bee*.
Xylography (zi-log'ra-fi), a name sometimes given to wood-engraving.

Y.

Y, the twenty-fifth letter of the English alphabet, was taken from the Latin, the Latin having borrowed it from the Greek *Y* or *upsilon*. In modern English it is both a consonant and a vowel. At the beginning of syllables and followed by a vowel it is a consonant; in the middle and at the end of words it is a vowel.

Y, or *Ij* (both pronounced i), the western arm of the *Zuider Zee* on which *Amsterdam* is situated. See *Amsterdam*.

Yablonoi. See *Stanovoi Mountains*.

Yacht (yot), a light and elegantly fitted up vessel, used either for pleasure trips or racing, or as a vessel of state to convey kings, princes, &c., from one place to another by sea. There are two distinct species of yacht: the mere racer, with enormous spars and sails and deeply-ballasted hull, with fine lines, but sacrificing everything to speed; and the elegant, commodious, well-proportioned travelling yacht, often with steam-propelling machinery, fit for a voyage round the world. A type of yacht much used in America is that with a centre-board or sort of movable keel. (See *Centre-board*.) The practice of yachting as well as the word yacht was derived from the Dutch. The word yacht is found in use in English in Elizabeth's time, and James I. had a yacht built for his son Henry early in the 17th century, but it was not till long after that yachting became a favourite pastime with the rich. The first yachting club in the United Kingdom was the *Cork Harbour Water Club* (now the *Royal Cork Yacht Club*), established in 1720. In 1812 the *Royal Yacht Squadron* was established by fifty yacht-owners at *Cowes*, and was called the *Yacht Club*, which in 1820 became the *Royal Yacht Club*, and in 1832 the *Royal Yacht Squadron*. The *Royal Thames Yacht Club* was founded in 1823. In Scotland the *Royal Northern Yacht Club* was founded in the *Clyde* in 1824, and the *Royal Eastern Yacht Club* at *Granton*, near *Edinburgh*, in 1836. The *Yacht-racing Association*, established in 1875, drew up a simple code for the regulation of yacht races, and they were generally accepted by the numerous yacht

clubs throughout the kingdom. The first yacht club in the United States was established at *New York* in 1844. There are now many clubs in the States, established in connection with the great lakes as well as the sea. In 1851 the *America*, built at *New York*, carried off a cup given by the *Yacht Squadron* at *Cowes*, and her victory led to considerable modifications in the build of British yachts. In subsequent contests the American yachts have held their own, and the cup has never re-crossed the Atlantic. The latest efforts to regain it have been those of *Sir T. Lipton*.

Yak, the *Bos* or *Poephagus grunniens*, a fine large species of ox, with cylindric horns, curving outward, long pendent silky hair fringing its sides, a bushy mane of fine hair,



Yak (*Bos grunniens*).

and long, silky, horse-like tail; inhabiting, both in the wild and the domesticated state, Tibet and the higher plateaus of the *Himalayas*; called *grunniens* (grunting) from its very peculiar voice, which sounds much like the grunt of a pig. It is the ordinary domestic animal of the inhabitants of those regions, supplying milk, food, and raiment, as well as being used as a beast of burden and to draw the plough. The tail of the yak is in great request for various ornamental purposes, and forms an important article of commerce.

Yakub Khan, MAHOMED, Amir of *Afghanistan*. See *Afghanistan*.

Yakutsk, a province of *Eastern Siberia*, includes nearly the whole of the basin of

YALE UNIVERSITY — YARD.

the Lena, between which river and its tributary, the Vitim, rich gold mines are worked. Area, 1,517,127 sq. miles. Pop. 269,880. — YAKUTSK, capital of the province of the same name, stands on a branch of the Lena, and is the principal trade-centre of Eastern Siberia. Pop. 7000.

Yale University, one of the oldest and largest of American universities, originally a collegiate school established at Saybrook, Connecticut, in 1701. It was removed in 1716 to New Haven, and soon after its name was changed to Yale College, after Elihu Yale (1649-1751), a native who had amassed a fortune in India, and was an early benefactor of the institution. It has four faculties or departments: philosophy, theology, law, and medicine, in all of which its governing body grants degrees. The first of these includes, besides the original academic or arts department of Yale College, a scientific and engineering school, a school of fine arts, and also post-graduate courses. The aggregate number of volumes in all the libraries of the university is over 300,000, of which 1000 were presented in 1730 by Bishop Berkeley. Its buildings are now very extensive, and its funds have greatly increased by private munificence. The teaching staff numbers over 200, and the total number of students over 2500.

Yam, a large esculent tuber or root produced by various plants of the genus *Dioscorea*, order Dioscoreaceæ, growing in the warmer regions of both hemispheres. Yams, when roasted or boiled, form a wholesome, palatable, and nutritious food, and are extensively cultivated in many tropical and sub-tropical countries. The Chinese or Japanese yam (*D. Batatas*) contains more nitrogenous and therefore nutritive matter, but less starch, than potatoes. It is hardy in Great Britain and thrives in the United States, but its cultivation is impeded by the great depth to which its roots descend. The tubers of *D. alata*, the West Indian yam, one of the species most widely diffused, sometimes attain a weight of 50 lbs.

Yama, a Hindu god, the judge of the dead, whose good and bad actions are read to him out of a record, and who according to their merits and demerits are sent to the celestial or to the infernal regions. Hindus offer to him daily oblations of water.

Yang-tze-kiang, one of the two great rivers of China, is formed by two streams rising in Eastern Tibet, in lat. 26° 30' N., lon. 102° E., and after flowing east and

then south enters the Chinese province of Yunnan. Pursuing a very tortuous course, much of it through most fertile and densely-populated regions, it reaches the great city of Nanking, 200 miles from the sea, where it widens gradually into the vast estuary which connects it with the Yellow Sea. Its whole course, under various names, is 2900 miles, and the area of its basin is computed to be 548,000 square miles. It is connected by the Grand Canal with the Hoang-ho or Yellow River, and is navigable for vessels of considerable draught for 1200 miles from its mouth. By the Treaty of Tien-tsin the Lower Yang-tze was opened to European trade; and 700 miles from its mouth is the treaty-port of Hangkow, the great commercial port of Mid-China. The highest port on the river at present reached by steamers is the treaty-port Ichang, 1000 miles from its mouth.

Yan'ina. See *Janina*.

Yankee, a cant name for Americans belonging to the New England states. During the American Revolution the name was applied by the British to all the insurgents; and during the civil war it was the common designation of the Federal soldiers by the Confederates. In Britain the term is sometimes improperly applied generally to natives of the U. States. The most common explanation of the term seems also the most plausible, namely, that it is a corrupt pronunciation of *English* or of French *Anglais* formerly current among the American Indians.

Yankee-Doodle, a famous air, now regarded as American and national. In reality the air is of English origin, and not older than about the middle of the eighteenth century. The really national tune of the whole United States, however, is 'Hail, Columbia!'

Yankton, a town of the United States, in South Dakota, on the north bank of the Missouri, 980 miles above its junction with the Mississippi. It is a well-laid-out town, connected by steamers with all the ports on the Missouri. Pop. 4125.

Yard, a British and American standard measure of length, equal to 3 feet or 36 inches, the foot in general being made practically the unit. As a cloth measure the yard is divided into 4 quarters = 16 nails. A square yard contains 9 square feet, and a cubic yard 27 cubic feet. See *Weights and Measures*.

Yard, in ships, a long cylindrical piece of timber, having a rounded taper toward each

end, slung crosswise to a mast, for the purpose of extending a sail. They are named similarly to the sails: main yard, main top-sail yard, fore royal yard, and so on. (See *Sail*.) They are kept close to the mast by hoops of iron or rings of rope, are raised by halyards and swung round to suit the wind by braces. Either end of a yard is called the *yard-arm*.

Yare, a river of England, which, rising about the middle of Norfolk, flows east past Norwich, and after receiving the Waveney widens into the estuary of Breydon-water, is joined by the Bure, and enters the German Ocean $2\frac{1}{2}$ miles below Great Yarmouth, after a course of about 30 miles.

Yarkand, the chief town of the principal oasis of Chinese Turkestan, is situated on the river Yarkand. It is inclosed by a thick mud wall, and its rich gardens are well-watered by numerous canals. The inhabitants, chiefly Persians, are keen traders. Pop. about 60,000.—The river rises in the Karakorum Mountains, and helps to form the river Tarim, which enters Lob Nor.

Yarmouth, or, as it is more strictly called, GREAT YARMOUTH, an English seaport, important fishing-station, watering-place, and municipal, parl., and county borough, in the county of Norfolk, 20 miles east of Norwich. It is situated on a long and narrow tongue of land running from north to southward between the German Ocean and the estuary of the Yare. The town is connected by a bridge with Little Yarmouth, or South Town, in Suffolk. Along the sea frontage stretches a promenade and carriage-drive for three miles, with two piers. Parallel with the north and south quays, extending for nearly a mile and a quarter, are the principal streets, crossed by numerous narrow lanes called 'rows.' The parish church of St. Nicholas, founded in 1101, and of late years completely restored, is one of the largest in the kingdom. Yarmouth has a naval lunatic asylum, the only one in the kingdom. It is the great seat of the English herring and mackerel fishery, and also furnishes large quantities of white-fish. The curing of herring as 'Yarmouth bloaters' is an important industry. The coast is dangerous, but Yarmouth Roads, between the shore and a range of sandbanks, offers a safe anchorage. Pop. 51,316.

Yarmouth, a seaport town of Nova Scotia, 205 miles south-west of Halifax, the chief shipbuilding place in the province, and also a summer resort. Pop. 6430.

Yarn, any textile fibre prepared for weaving into cloth. See *Thread*.

Yaroslaw. See *Jaroslaw*.

Yarr, a well-known British and European plant, *Spergula arvensis*. See *Spurrey*.

Yarra-Yarra, the Australian river on which Melbourne, Victoria, is situated. Its length is about 100 miles. On account of falls it is not navigable above Melbourne. See *Melbourne*.

Yarrell, WILLIAM, an eminent naturalist, was the son of a newspaper agent in London; born there in 1784, died 1856. He assisted in and succeeded to his father's business. He contributed frequently to the Transactions of the Linnean Society, of which he became a fellow, and to natural history periodicals. His two works, the History of British Fishes (1836, &c.) and the History of British Birds (1843, &c.), are standard authorities.

Yarriba. See *Yoruba*.

Yarrow, a name given to a British plant, *Achillaea millefolium*, also known by the name *milfoil* (which see).

Yarrow, a parish in Selkirkshire, Scotland, chiefly pastoral, celebrated for its poetical and historical associations. The river Yarrow, famous in song, issues from the foot of St. Mary's Loch, and flowing $14\frac{1}{2}$ miles eastward falls into the Ettrick, 2 miles s.w. of Selkirk.

Yataghan (yat'a-gan; Turk. *yatagan*), a sort of dagger-like sabre with double-curved blade, about 2 feet long, the handle without a cross-guard, much worn in Mohammedan countries.

Yawl, a small ship's boat, usually rowed by four or six oars; a jolly-boat; also a sailing boat similar to a cutter, but having a small mizzen-mast and sail near the stern.

Yawning, an involuntary opening of the mouth, generally produced by weariness, tedium, or an inclination to sleep, sometimes by hunger, &c. When yawning is troublesome, long, deep respiration, or drawing in the air at long intervals, relieves it.

Yaws, a disease occurring in America, Africa, and the West Indies, and almost entirely confined to the African races. It is characterized by cutaneous tumours, numerous and successive, gradually increasing from specks to the size of a raspberry, one at length growing larger than the rest; core a fungous excrescence; fever slight, and probably irritative merely. It is contagious, and cannot be communicated except by the actual contact of yaw matter to

some abraded surface, or by inoculation, which is sometimes effected by flies. It is also called *frambasia*, from the French *framboise*, a raspberry.

Yazoo River, a river of the U. States, 290 miles long, navigable throughout its course, which is entirely in the state of Mississippi, joining the Mississippi River 12 miles above Vicksburg.

Year, the period of time during which the earth makes one complete revolution in its orbit, or the period which elapses between the sun's leaving either equinoctial point, or either tropic, and his return to the same. This is the *tropical* or *solar* year, and the year in the strict and proper sense of the word. This period comprehends what are called the twelve calendar months, and is usually calculated to commence on 1st January and to end on 31st December. It is not quite uniform, but its mean length is about 365 days, 5 hours, 48 minutes, and 51.6 seconds. In popular usage, however, the year consists of 365 days, and every fourth year of 366. See *Leap-year*.—*Anomalous year*. See under *Anomaly*.—*Civil year*, the ordinary year of 365 days.—*Ecclesiastical year*, from Advent to Advent.—*Gregorian year*, *Julian year*. See *Calendar*.—*Lunar year*, a period consisting of 12 lunar months. The *lunar astronomical year* consists of 12 lunar synodical months, or 354 days, 8 hours, 48 minutes, 36 seconds. The *common lunar year* consists of 12 lunar civil months, or 354 days. The *embolismic* or *intercalary lunar year* consists of 13 lunar civil months, and contains 384 days.—*Sabbatical year*. See *Sabbath*.—*Sidereal year*. See *Sidereal Time*.

Yeast, the yellowish substance, having an acid reaction, produced during the vinous fermentation of saccharine fluids, rising to the surface, when the temperature of the fluid is high, in the form of a frothy, flocculent, viscid matter (*surface yeast*), and falling to the bottom (*sediment yeast*) when the temperature is low. The ordinary yeast of beer consists of an immense number of minute cells, which constitute a plant called the yeast-plant, which multiplies by budding off other cells, or sometimes by spores. Little is known regarding the genesis of the yeast-plant. Pasteur's researches seem to show that the yeast which forms in grape juice is derived chiefly from certain germs abounding about harvest-time on the grapes, and diffused throughout the atmosphere of breweries and wine-cellar,

&c. Yeast is not only generally essential to the production of wine from grape and other fruit juices, and to the manufacture of beer, but it is also an agent in producing the fermentation whereby bread is rendered light, porous, and spongy, and in Britain at least has superseded leaven. (See *Fermentation*.)—*German yeast* is prepared in various ways from common yeast collected, drained, and pressed till nearly dry. It can be so kept for several months, and is much used by bakers.—*Patent yeast* is yeast collected from a wort of malt and hop, and treated similarly to German yeast.—*Artificial yeast* is a dough of flour and a small quantity of common yeast made into small cakes and dried. Kept free from moisture, it long retains its fermenting property.

Yeddo. See *Tokio*.

Yeisk. See *Yeisk*.

Yeletz. See *Yeletz*.

Yell, the second largest of the Shetland Islands, separated from the Mainland by Yell Sound, and 25 miles N. of Lerwick. It is about 17½ miles in length, and from half a mile to 6 miles in breadth. The surface is chiefly moorland, and fishing is the leading employment. Pop. 2488.

Yellow, one of the prismatic colours; the colour of that part of the solar spectrum situated between the orange and the green; a bright golden colour, the type of which may be found in the field buttercup, which is a pure yellow. United with blue it yields green; with red it produces orange. See *Colour* and *Spectrum*.

Yellow-berries. See *French Berries*.

Yellow-bird, a small singing bird common in the United States, the *Fringilla* or *Chrysomitris tristis*. The summer dress of the male is of a lemon yellow, with the wings, tail, and fore part of the head black. When caged the song of this bird greatly resembles that of the canary.

Yellow-fever, popularly known as Yellow Jack, a malignant febrile disease, indigenous chiefly to the West Indies, northern coasts of South America, the borders of the Gulf of Mexico, and the Southern United States. It is attended with yellowness of the skin, of some shade between lemon-yellow and the deepest orange-yellow. The symptoms may appear within one or two days after the poison has entered the person's body, or may not occur for six or ten. The attack is sudden, beginning with shivering, headache, pain in the back and limbs, with fever. It is most fatal from May to August;

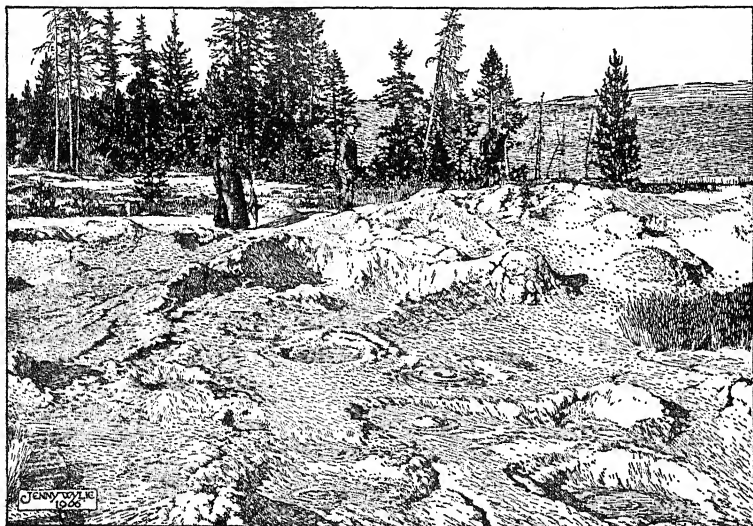
YELLOW-HAMMER—YELLOWSTONE NATIONAL PARK.

is very contagious, but a sufferer from one attack is nearly safe from a second. It has occasionally appeared in Europe, but does not spread; cold weather kills it.

Yellow-hammer, **YELLOW-AMMER**, a passerine bird of the genus *Emberiza*, the *E. citrinella*; called also *yellow-bunting*. The head, cheeks, front of the neck, belly, and lower tail-coverts are of a bright yellow;

the upper surface is partly yellow, but chiefly brown, the feathers on the top of the back being blackish in the middle, and the tail feathers are also blackish. The yellow-hammer is a resident in Britain, and generally throughout Europe.

Yellow-pine, a North American tree, *Pinus mitis* or *variabilis*. The wood is universally employed in the countries where



The 'Paint-Pots', Yellowstone Lake.

it grows for domestic purposes, and is also extensively exported to Britain and elsewhere. In Canada and Nova Scotia the name is given to *P. resinosa*, and it is also applied to *P. australis*.

Yellow River. See *Hoang-ho*.

Yellows, an inflammation of the liver, or a kind of jaundice which affects horses, cattle, and sheep, causing yellowness of the eyes.

Yellow Sea (Chinese, *Whang-hai*), an arm of the Pacific Ocean, on the north-east coast of China; length, about 620 miles; greatest breadth, about 400 miles. It is very shallow, and obtains its name from the lemon-yellow colour of its water near the land, caused by mud suspended in the water from the inflow of the rivers Hoang-ho and Yang-tse-kiang.

Yellowstone National Park, a region

mainly in Wyoming, U.S., which in 1872 was withdrawn from settlement by the United States government to become a park or tract for the recreation of the people. Its area is 3350 square miles, besides an additional reserved forest area of 2000 miles. It is accessible by a branch of the Northern Pacific Railway. Its surface is mainly an undulating plain, diversified, however, by great mountain ranges, one of which, the Absaroka, a range separating the waters of the Yellowstone River (which see) from those of the Big Horn, contains some of the grandest scenery in the United States. The whole region exhibits an endless variety of wild volcanic scenery—hot springs, mud volcanoes, geysers, cañons, waterfalls, &c. The geysers are more remarkable than those of Iceland, and the Grand Geyser in Firehole Basin is the most

YELLOWSTONE RIVER — YEW.

magnificent natural fountain in the world. The Yellowstone Lake, one of many, is a magnificent sheet of water, with an area of 150 sq. miles. A large part of the park is covered with forest. Stringent legislation protects the game, with the result that elk, deer, antelope, bear, and bison have taken refuge in it.

Yellowstone River, a river of the United States, which rises in the Rocky Mountains, about lat. 44° N. and lon. 110° W. After a course of about 25 miles it passes through the lake of the same name, and runs northward through the Yellowstone National Park. Soon after issuing from the lake the river makes at intervals a series of falls (the last being 300 feet high), and traverses cañons, one of which, the Great Cañon, is 30 miles in length, its steep sides being coloured in bright hues and shaped in great variety of fantastic forms. Running in a north-easterly direction the river ultimately joins the Missouri about lat. 48° N., after a course of some 1100 miles. Steamers can ascend it for 300 miles to the mouth of the Big Horn, which is its largest affluent.

Yellow-throat, a small North American singing bird (*Sylvia Marilandica*).

Yemen, a division of Arabia, occupying the south-west angle of the peninsula, and known as Arabia Felix. Some portions of it are very fertile. Amongst its principal products is coffee, to a specially prized kind of which Mocha, one of its seaports, has given a name everywhere known. Estimated area, 70,000 square miles; estimated population, about 600,000. (See *Arabia*.) The chief potentate is the Imám of Sana, a tributary of Turkey.

Yen, a Japanese dollar or money unit equivalent to 2s. 0½d. sterling.

Yen'ikalé, STRAIT OF, connecting the Black Sea with the Sea of Azof, is about 20 miles long, and in some parts only 2 miles broad and 2 fathoms deep.

Yenisei (yen'-si), a great river of Asia, rises in Mongolia, flows northward through Siberia, and after a course of about 2500 miles, great part of it navigated by steamers, enters the Arctic Ocean.

Yeniseisk, a vast province of Eastern Siberia, extending from the Chinese frontier to the Arctic Ocean; area, 992,870 sq. miles. It contains rich auriferous deposits. Pop. 559,902. — The capital, of the same name, is the chief entrepôt for the gold mines of the province and the Siberian fur-trade. Pop. 12,000.

Yeomanry, a volunteer cavalry force originally embodied in Britain during the wars of the French Revolution. They furnished their own horses, but had an allowance for clothing, the government also supplying arms and ammunition. This force formed the nucleus of the Imperial Yeomanry, a body of volunteers raised for service in South Africa, afterwards an integral part of the British military system, and now incorporated in the Territorial Army.

Yeomen of the Guard. See *Beef-eaters*.

Yeovil (yó'vil), a municipal borough of England, in Somerset, on the river Yeo or Ivel, 40 miles south of Bristol. It has a fine cruciform church dating from the 15th century, and is noted for its manufacture of gloves. Pop. 9838.

Yesso, **YEZO**, or **Jesso**, the most northerly of the larger Japan islands, has an area of about 35,000 square miles, and a pop. of 843,615, including a number of Ainos, a docile aboriginal race. The island is mountainous and volcanic, and is rich in minerals, including coal, gold, and silver. Matsmai and Hakodadi (which see) are the chief towns. Its official name is *Hokkaido*.

Yew, an evergreen tree of the genus *Taxus*, natural order Taxaceae. The common yew is *T. baccata*, indigenous in most parts of Europe, and found in many parts of Great Britain and Ireland.

It is a handsome tree, growing to a height of from 30 to 40 feet, with numerous spreading branches, forming a dense head of foliage. Its trunk is thick, and has been known to attain a circumference of 56 feet. Its fruit is a red berry with green seeds. It used to be frequently planted in churchyards, and its tough elastic wood was extensively used in the manufacture of bows. In our own days, on account of the durability of the timber, and of its hard, compact, close grain, it is much used by cabinet-makers and turners. There are several varieties of it, the Irish yew, which has a more upright growth than the common yew, being esteemed the finest. The American yew (*T. baccata canadensis*)



Yew (*Taxus baccata*).

is a low prostrate shrub, never forming an erect trunk. It is found in Canada and the more northern of the U. States, and is commonly called *ground-hemlock*.

Yezd, a city of Persia, province of Faristan, in an oasis in a sandy plain 190 miles south-east of Ispahan. It is noted for its velvet and other silk manufactures, and contains about 4000 fire-worshippers. Pop. about 50,000.

Ygdrasil, **YGGDRASIL** (ig'dra-sil), in Scandinavian mythology, the giant ash-tree spread over the whole world reaching above the heavens, symbolizing the universe, the branches of which reach down to the under world, or Scandinavian hell.

Yokohama, a great Japanese seaport, 17 miles south-west of Tokio, the capital of the empire, with which and with other towns it is connected by railway, on the Bay of Tokio, adjoining Kanagawa. It is quite modern, well laid out, has many fine buildings, and its docks and other accommodation for shipping and commerce are in the European style. Japanese, British, and other steamers share in its trade. The foreign exports in 1905 were £14,861,832; the imports, £19,264,800. Pop. 351,550, including Kanagawa (1100 British).

Yonge (yong), **CHARLOTTE MARY**, English authoress, born at Otterborne, Hants, 1823. Her writings are very numerous, and include the well-known stories *The Heir of Redclyffe*, *The Little Duke*, *Dynevor Terrace*, *The Daisy Chain*, &c. She has published a work on *Christian Names*, *A Life of Bishop Patteson*, and numerous historical works for the young, including her *Cameos from English History*. She died in 1901.

Yonkers, a town in New York state, U.S., on the east bank of the Hudson, 16 miles by railway north of New York city, many of the merchants of which own handsome residences in it. There are manufactures of felt hats, silk, reapers and mowers, carpets, pencils, &c. Pop. 47,931.

Yonne, a department of Central France, traversed by the river Yonne, which is navigable throughout it. The granite mountains in the south-east attain a height of 2000 feet. The soil is very fertile, producing large wheat crops, and the vines yield the finest red wines of Lower Burgundy, and the finest of white wines, the well-known Chablis. Auxerre is the capital. Area, 133,475 acres. Pop. 321,062.

York, the largest county of England, is bounded on the north by the Tees, separat-

ing it from Durham, east by the North Sea, south by Lincoln, Nottingham, Derby, and Chester, and west by Chester, Lancaster, and Westmoreland; area, 3,882,848 acres, or nearly 6067 square miles. Total pop. in 1901, 3,585,122. Yorkshire consists of three divisions: the North Riding, with 1,361,465 acres, pop. 893,143; the East, with 753,104 acres, pop. 445,112; and the West Riding, 1,768,279 acres, pop. 2,746,867; each Riding having a separate lord-lieutenant. The main portion of this county forms a large central valley stretching s.e. to the Humber, flanked on one side by the Pennine range and on the other by the Cleveland Hills, and drained chiefly by the Ouse and its tributaries. Considerably more of the North Riding is pasture than under cultivation, but it includes the vale of York, with an area of about 1000 square miles, in which there is much fertile land growing all kinds of crops. It also includes the Cleveland district, with its great bed of iron ore. In the North Riding is the capital of the county, York; Scarborough, a favourite watering-place; and Middlesbrough, famous for iron. For parliamentary purposes the North Riding is formed into four divisions, viz. Thirsk and Malton, Richmond, Cleveland, and Whitby, each division returning one member. In the East Riding the area under cultivation greatly exceeds that laid down in permanent pasture. Its industrial activity is centred in the great seaport of Hull. For parliamentary purposes it is formed into three divisions: Buckrose, Holderness, and Howdenshire, each returning one member. In the West Riding the proportion of land laid down in permanent pasture is larger than in any other, being more than twice that under cultivation. In the North and West Riding there is much mountain pasture-land. The West Riding has long been famous for its woollen and worsted manufactures, of which it is now the chief seat. Their development has been aided by the proximity of coal and iron. The great coal-field of the West Riding, part of that of Central England, yields not only excellent house coal, but also coal admirably fitted for iron-smelting and for use in engine furnaces. Leeds produces every variety of woollen goods; Bradford, mixed worsted fabrics and yarns; Dewsbury, Batley, and adjoining districts, shoddy; Huddersfield, plain goods, with fancy trousers and coatings; and Halifax, worsted and carpets. Barnsley is famous for its

linen manufactures, of which Leeds also is a seat, as well as of that of leather. Next to the woollen and other textile industries comes the manufacture of iron and steel machinery, and implements of every description. Leeds is one of the principal seats of all kinds of mechanical engineering, and Sheffield of iron-work and cutlery. For parliamentary purposes the West Riding is divided into three parts, north, east, and south. The northern part is formed into five divisions: Skipton, Keighley, Shipley, Sowerby, and Elland; the Eastern into six divisions: Rippon, Otley, Barkston Ash, Osgoldcross, Pudsey, and Spen Valley; and the Southern into eight divisions: Morley, Norman-ton, Colne Valley, Holmfirth, Barnsley, Hallamshire, Rotherham, and Doncaster. Each of these divisions returns one member.

York (British, *Caer Eborac*, or *Eborac*; Latin, *Eboracum*), a cathedral city and archbishop's see, a municipal, county, and parl. borough, and capital of Yorkshire, 188 miles north of London by rail, is situated at the confluence of the Foss and the Ouse. The city proper, embracing a circuit of nearly 3 miles, was inclosed by walls, restored by Edward I., the portions of which still remaining have been converted into promenades, commanding a prospect of the surrounding country. There are many quaint old-fashioned houses in the narrow streets of its older portion. The great object of attraction, however, is the minster or cathedral, the finest in England, which dates from the 7th century, but did not begin to assume its present form till the 12th century, and was not completed till 1472. It is built in the form of a Latin cross with choir, aisles, transepts, a central tower and two western towers; extreme length, 524 feet; breadth, 250; height of central tower, 213 feet. (See cut at *Decorated Style*.) The city has a splendid railway-station, and its industries are varied and rather important. York was the capital of Roman Britain. It was made an archiepiscopal see by Edwin of Northumbria in 624, its archbishop having the title of Primate of England (see *Archbishop*). Its chief magistrate takes the title of lord-mayor. It was incorporated by Henry I., and the city boundaries were extended in 1884 and 1893. It sends two members to parliament. Pop. (city and co. bor.), 77,914.

York, capital of York county, Pennsylvania, U.S., has some historical interest attached to it from the fact that for nearly a year (1777-78) it was the place of meeting

of the Continental Congress. It possesses foundries, manufactories of agricultural implements, &c. Pop. 33,708.

York, House of, an English royal house, the rival of that of Lancaster. The House of York was united to the House of Lancaster when Henry VII. married the eldest daughter of Edward IV. The emblem of the Yorkists was a white rose. See *England (History)*.

York Peninsula, in Queensland, Australia, the region lying on the east side of the Gulf of Carpentaria, and terminating at its north end in Cape York.

Yorktown, capital of York county, Virginia, U.S., on the right bank of York river, nearly 10 miles from its mouth, was the scene of the surrender of Lord Cornwallis to General Washington, October 19, 1781. In the civil war it was fortified by the Confederates, who, having been besieged by General M'Clellan, evacuated it May 4, 1862. Pop. about 1000.

Yor'uba, a country of West Africa, north of the Bight of Benin. It is peopled by a number of confederated tribes, and is now attached to the colony and protectorate of Lagos. Much of the country is fertile and well cultivated, and the inhabitants have made great progress in the industrial arts. They are chiefly pagans, but Mohammedanism has made way among them. Protestant and Roman Catholic missions have long been at work among them. Ibadan is the largest town.

Yo-Semite (sem'i-te) **Valley**, one of the greatest natural wonders of North America, is in Mariposa county, California, about 140 miles south-east of San Francisco and midway between the eastern and western bases of the Sierra Nevada. It is a narrow valley at an elevation of 4000 feet above the sea, and is itself nearly level, about 6 miles in length, and varying in width from $\frac{1}{2}$ mile to a mile. On each side rise enormous domes and almost vertical cliffs of granite, one of them called the Half Dome being 4737 feet higher than the river Merced at its base, while the more important waterfalls are the Yosemite and the Bridal Veil. This valley has been added by Congress to the state of California, on condition that it shall be kept as a public park or free domain 'inalienable for all time.'

Youghal (yal), a seaport of Ireland, on the estuary of the Blackwater, county Cork, 28 miles east of Cork. It has manufactures of coarse earthenware and bricks, a salmon

YOUNG — YOUNG IRELAND PARTY.

fishery, and some reputation as a watering-place. Pop. 5393.

Young, ARTHUR, a distinguished agricultural writer, was the son of a Suffolk rector, and born in 1741; died 1820. He became a farmer, and made a series of agricultural tours in England, Ireland, and France, publishing accounts of them, which were very favourably received, and in 1793 he was appointed secretary to the newly-constituted Board of Agriculture. Of his many writings his *Travels in France*, published in 1792, is the most interesting, from its sketches of the social as well as the agricultural condition of the French provinces just before and just after the revolution of 1789.

Young, BRIGHAM, president of the Mormon Church, was born in 1801 in the state of Vermont, U.S. In 1831 he became a Mormon, and an active preacher of the Mormon doctrine. He was one of the twelve founders of Nauvoo, and after the murder of the prophet, Joseph Smith, and the flight of the Mormons from Nauvoo, Young became their leader, was elected their president on their settling in Utah, and when this was made a territory he was appointed its governor by President Polk. In 1852 he announced that polygamy had been commanded in a special revelation to Joseph Smith, and it was accepted generally by the Mormons of Utah. Young was a man of great practical ability. Utah flourished under his rule, and he long withstood successfully the efforts of the United States' government to establish its authority there. He died in 1877.

Young, EDWARD, English poet, was the son of a dean of Salisbury, and born in 1681. He was educated at Winchester and Oxford, and obtained in 1708 a law fellowship at All Souls. Patronized and pensioned by the profligate Duke of Wharton, he wrote some poems and a couple of plays, one of which, *The Revenge*, long kept possession of the stage. His first great literary success was his production of a series of satires, issued collectively in 1728 as *The Love of Fame, the Universal Passion*. When nearly fifty he took orders, was made (1730) a royal chaplain and rector of Welwyn, Herts. Between 1742 and 1744 appeared the work by which chiefly he is remembered, the gloomy but striking *Night Thoughts*. He died in 1765.

Young, JAMES, an eminent practical chemist, was born at Glasgow in 1811, and died in 1883. He studied chemistry under Professor Graham at Anderson's College,

Glasgow, and became his assistant both there and at University College, London. Receiving appointments in chemical works at St. Helen's and Manchester, he discovered a method of distilling oil from shale, through which he became the founder of the mineral oil industry of Scotland, besides leading to the development of the petroleum industry in America and elsewhere. He acquired a large fortune, and endowed a chair of technical chemistry in Anderson's College, Glasgow. He was F.R.S. and LL.D.

Young, THOMAS, M.D., scientist, born of a Quaker family at Milverton in Somersetshire, in 1773. He qualified himself for the medical profession, but a fortune left him made him rather languid in his practice as a physician in London. In 1802 he became the colleague of Davy as professor of natural philosophy at the Royal Institution, having previously made the discovery of the interference of light, the result of researches which, completed by Fresnel, secured the triumph of the undulatory theory. In 1807 appeared his admirable *Lectures on Natural Philosophy*. In 1818 he was appointed secretary to the Board of Longitude, with the charge of supervising the *Nautical Almanack*. Young preceded Champollion in the discovery of the alphabetic character of certain of the Egyptian hieroglyphs. He was a man of universal accomplishments, adding to his scientific and mathematical attainments a knowledge of the classical and the principal modern and oriental languages. He died in 1829.

Young England Party, THE, was formed about 1844 by Mr. Disraeli, after he had begun to oppose the general policy of Sir Robert Peel. Besides its founder it contained some young men of ability and position, prominent among them being Lord John Manners, late Duke of Rutland; Mr. George Smythe, afterwards Viscount Strangford; and Mr. Baillie-Cochrane, afterwards Lord Lamington. Its programme was the reconciliation of the aristocracy and the Church on the one hand, and the people on the other. Its principles were attractively expounded in Disraeli's two fictions, *Coningsby* and *Sybil*.

Young Ireland Party, THE, was formed towards the close of the career of O'Connell by a knot of enthusiastic young Irishmen who were dissatisfied with his plans of constitutional agitation, and were opposed to the influence of the priesthood. Its leaders were Charles Gavan Duffy, John Mitchel, Thomas

Francis Meagher, and Smith O'Brien. Their advocacy of and resort to physical force was punished by the transportation of some of the leaders, and gave a death-blow to the party.

Young Men's Christian Associations. Among the first of these was that founded in London in 1844 by Sir George Williams. Its object was the holding of religious meetings in business houses in the centre of London. The movement extended, and became one not only for the religious but for the general culture and social well-being of young men engaged in business. The young men's Christian associations, all of which are self-governing while forming an organized union, are now between 7000 and 8000 in number, with a total membership of more than 800,000, the centres being scattered over the world. In the United Kingdom there are about 200,000 members, in the United States far more. The headquarters of the English Union are at Russell Square, London.

Youngstown, town in Mahoning county, Ohio, U.S., on the Mahoning river, 66 miles south-east of Cleveland, in the vicinity of iron ore and coal beds; has rolling-mills, blast-furnaces, and manufactures of machinery, &c. Pop. 44,885.

Young Women's Christian Associations, on the same basis as the young men's, were founded in 1857 by the Dowager-Lady Kinnaid, and now exist in various cities of Britain and America.

Ypres (ɛ'pɛr; Flemish, *Ypern*, ɪ'pɛrn), a town of Belgium, in the province of West Flanders, 21 miles north-west of Lille. From it the linen called *diaper* (d'Ypres) took its name. Its chief manufacture is now lace. There is a fine Gothic cathedral of the 13th century, a fine old cloth-hall (1201-1304) with massive belfry, town-hall, &c. Pop. 16,137.

Ypsilanti, a distinguished Greek family claiming to be descended from the Comneni. DEMETRIUS, born in 1793, entered the Russian service, and joining the Greeks in their war of independence distinguished himself so highly as to be made commander-in-chief of the Greek army after the liberation of Greece from the Ottoman yoke. He died in 1832.

Yriarte. See *Iriarte*.

Yssel, or **IJSSEL** (both ɪ'sl), a river of the Netherlands, which leaves the Rhine near Arnhem, and receiving the Old Yssel from Rhenish Prussia, enters the Zuider Zee after a course of 80 miles.

Ysselmonde, IJSSELMONDE (ɪ'sl-mon-dé), an island of the Netherlands opposite the mouth of the Yssel. Pop. 7360.

Ystad (ɪ'städ), a seaport town of South Sweden, on the Baltic, 36 miles south-east of Malmö. It has a safe and spacious harbour, and among its industries is ship-building. Pop. 10,290.

Ystrad-y-fodwg, a parish of S. Wales, in Glamorganshire, comprising several populous villages, the inhabitants of which are chiefly engaged in the collieries. Pop. 113,735. As an urban dist. it now bears the name of Rhondda.

Yttria (it'ri-a), the protoxide of yttrium, a white powder, insoluble in water, but soluble in some acids. When ignited it glows with a pure white light. See next article.

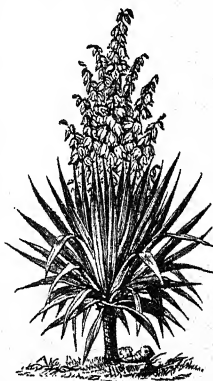
Yttrium (it'ri-um), one of the rare earth metals, having yttria as its oxide (see above); symbol Y, atomic weight 89. Its texture is scaly, and its colour grayish-black.

Ytu. See *Itu*.

Yucatan, a peninsula forming the south-eastern extremity of Mexico. Before its conquest by the Spaniards it was the seat of a flourishing civilization. It is now for the most part a sparsely cultivated region, whose forests yield excellent timber, cabinet-woods and dye-woods, and which has recently been productive of great quantities of sisal or so-called Yucatan hemp. Five-sixths of the inhabitants are Indians, preserving the speech of their ancestors, whom the Spaniards dispossessed. In 1861 the peninsula, which since 1824 had formed one state in the Mexican

Confederation, was divided into two: Yucatan, area 29,560 square miles, pop. 302,500, capital Merida; and Campeachy, area 25,830 square miles, pop. 90,500, capital Campeachy.

Yucca, a genus of American plants, nat. order Liliaceæ. The species are handsome plants, with white flowers, extremely elegant, but destitute of odour. *Y. gloriosa*,



Yucca gloriosa.

or common Adam's needle, which along with other species has been acclimatized in Britain, is much prized on account of its panicle of elegant flowers, which attain a height of 10 or 12 feet. It yields a fibre well adapted for paper-making. *Y. filamentosa*, the silk grass, which has panicles of pendulous, cream-coloured flowers, grows in British gardens, blossoming in the autumn.

Yukon, a large river of N. America, rising in Canada about lat. $57^{\circ} 45' N.$, lon. $130^{\circ} 45' W.$, pursues a generally westward course, of which the length is estimated at 2000 miles, the greater portion in Alaska, and enters the Pacific by several mouths. For great part of its course it is navigable by steamers. See *Supp.*, also *Alaska, Canada, Klondike*.

Yule, the old English and Scandinavian name for Christmas, still to some extent in use, as in the term *yule-log*.

Yule, COLONEL SIR HENRY, R.E., born in 1820 near Edinburgh; died in 1889. Having entered the Indian army he served in the Sutlej campaign (1845-46), in the Punjab (1848-49), in Burmah, and in the Indian mutiny, and became secretary to the Public Works Department, in which capacity he took part in several important surveys and missions. In 1875 he was appointed a member of the Home Council of India. Of the many works which he wrote and edited, the most noted is his admirable translation, with notes and maps, of Marco Polo (1871; augmented edition, 1875). He edited several volumes for the Hakluyt Society; was a gold medallist of the Royal Geographical Society; C.B.; K.C.S.I.; LL.D. of Edinburgh, &c.

Yunnan, the most south-westerly pro-

vince of China, is bounded on the south by Annam, Siam, and Burmah, and on the west by Burmah. It is extremely rich in minerals, especially iron and copper, containing also many varieties of precious stones. At least a third of the cultivated land is said to be under the poppy. The inhabitants are for the most part Chinese; but there is a large number of non-Chinese Mohammedans (called by the Burmese Panthays). In 1869 the Mohammedans rose in rebellion against the Chinese government, and succeeded in establishing an independent government, but it lasted only three or four years. By the convention of Chefoo in 1876 the establishment of commercial relations between British subjects and Yunnan was conceded by the Chinese government. Estimated area, 122,500 square miles; estimated pop. 12,000,000.—**YUNNAN**, the capital, is situated in the south-east, and is a busy and prosperous town, with large copper factories, and manufactures of silks and carpets. Pop. 200,000.

Yurua'ri, a district in eastern Venezuela, rich in gold mines, so named from the river Yuruari.

Yverdon (ÿ-ver-dōn), a town in the canton of Vaud, Switzerland, on Lake Neuchâtel, was the seat of Pestalozzi's celebrated educational institute in 1805-25. Pop. 6330.

Yvetot (ÿv-tō), a town of France, in the department of Seine-Inférieure, 24 miles north-west of Rouen. From the 15th to the middle of the 16th century the lords of Yvetot bore the title of *king*, and their lands were exempt from service to the French crown; hence Béranger's famous song, *Le roi d'Yvetot*. Pop. 7233.

Z.

Z, the last letter of the English alphabet, is a sibilant consonant, and is merely a vocal or sonant *S*, having precisely the same sound that *s* has in *wise, ease, please*, &c. (See *S*.) The words in modern English which begin with *z* are all derived from other languages, mostly from the Greek. When not initial, however, we often find it representing an older *s* in genuine English words, as in *blaze, freeze, gaze, graze*, &c.

Zaandam, or SAARDAM, a town in the province of North Holland, 3 miles north-west of Amsterdam. It is noted chiefly as the place where in 1697 Peter the Great

worked for a short time as a ship-carpenter. Pop. (with suburbs), 31,700.

Zabern (tsä'bérn; French, *Saverne*), a town of Germany, in Alsace, at the foot of the Vosges Mountains, and on the Rhine and Marne Canal. Pop. 8498.

Zabians. See *Sabians*.

Zacate'cas, state of Mexico, belonging to the central table-land, and bounded by the states of Aguas-Calientes, Jalisco, Durango, Cohahuila, Nuevo-Leon, and San Luis Potosi. It is very rich in gold and silver, which are extensively mined. Area, 25,227 square miles. Pop. 462,190.—**ZACATECAS**,

ZACYNTHUS — ZAREBA.

the capital, 340 miles north-west of Mexico, is the centre of one of the oldest and most productive silver-mining districts in the republic. Pop. 46,000.

Zacynthus. See *Zante*.

Zaffre, an impure oxide of cobalt, used in painting upon porcelain.

Zagazig, the capital of the Egyptian province of Sharkiyeh, at the junction of the railways from Cairo, Suez, Alexandria, and Damietta, and on the fresh-water canal, 6 miles from Tel-el-Kebir, the scene of Lord Wolseley's victory over Arabi, Sept. 1882. Pop. 35,508.

Zaire. See *Congo*.

Zambe'si, the most important river in South-eastern Africa, and the largest flowing into the Indian Ocean, has its source in several streams uniting in the far interior. It flows first south-east and then north-east, then curves again to the south-east, and reaches the Indian Ocean by several mouths in the Mozambique Channel opposite Madagascar. The delta of the Zambezi commences about 90 miles from the coast, a little below the entrance of the Shire, which forms the outlet of Lake Nyassa. (See *British Central Africa*.) The length of the river is not less than 1600 miles, and it drains an area of 600,000 square miles. Its course as a whole is through fertile valleys and wooded plains; but the navigation is interrupted by rapids and cataracts, among the latter being the Victoria Falls in Rhodesia, which are among the grandest in the world. There is now a great railway bridge here. (See *Victoria Falls, Bridge*.) After passing through Rhodesia, in its middle course, the river enters Portuguese territory. The Portuguese territory here extends as far west as Zumbo, 450 miles from the sea. The western portion of this territory is rather narrow, extending to no great distance on either side of the stream. Farther west the Zambezi passes mainly through British territory, its early course being, however, in Portuguese territory. The navigation of the Zambezi is now free to vessels of all nations. The Chindé mouth is the only one practicable for navigation. See *Chindé*, also *Rhodesia*, &c.

Zamia, a genus of plants, nat. order Cycadaceæ. The species are found in tropical America, at the Cape of Good Hope, and in Australia, and partly resemble palms, partly tree-ferns. *Kaffir-bread* is a common name for the genus in South Africa, where the central part of the stem pith of

Z. Caffre is formed into cakes, baked, and eaten by the natives.

Zamo'ra, a city in Spain, capital of the province of the same name, 182 miles north-west of Madrid, on the right bank of the Douro. Pop. 16,417.

Zanesville, the county town of Muskingum county, Ohio, U.S., situated on the Muskingum River, 37 miles south of Cleveland; has rolling-mills, machine-shops, cotton and woollen factories, glass-works, &c. Pop. 23,538.

Zan'te (ancient, *Zacynthus*), one of the Ionian Islands, is 25 miles long, and about 12 miles broad; area, 277 square miles. The greater part of the interior consists of a fertile and productive plain, almost covered with the dwarf grape which produces the so-called currants. Olives, almonds, oranges, and wine are also produced. The highest point of the island rises to 2470 feet. Earthquakes occasionally occur. The staple export is currants. Pop. 42,500.—**ZANTE**, the capital, is a considerable seaport on its east side. Pop. 14,650.

Zanzibar', a sultanate of East Africa, which formerly comprised the whole coast between Magdishu (Magadoxo), about lat. 2° N., and Cape Delgado, lat. 10° 42' S., with the four islands of Zanzibar, Pemba, Lamu, and Mafia. The continental part of the sultanate has recently become part of British East Africa and German East Africa; while the island and town of Zanzibar, and the island of Pemba, are entirely under British protection. The island (area, 600 sq. miles) is very fertile and well cultivated, being especially suited for the cultivation of cloves, sugar, coffee, cocoa, and various spices, of which there is a considerable export. The population (200,000) is extremely heterogeneous, including Europeans, Arabs, half-caste Portuguese from the Malabar coast of India, and the Suahilis from the mainland.—**ZANZIBAR**, the chief town (100,000 inhabitants), on the west side of the island, is the centre of trade for the eastern seaboard of Africa, and of missionary and exploring work for the interior. At the instance of the British government the slave-trade has been abolished and slavery brought to an end in Zanzibar.

Zara, an Austrian seaport, capital of Dalmatia, lies on the Adriatic, 130 miles south-east of Trieste. Its chief industry is the preparation of the well-known liqueur maraschino. Pop. 32,506.

Zare'ba. See *Zereba*.

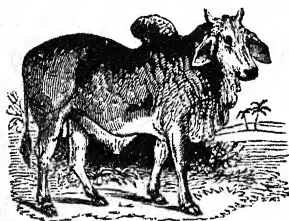
Zarskoje-Selo. See *Tsarsko-Selo*.

Zea (ancient *Ceos*), one of the Cyclades, in the Aegean Sea, 14 miles from the coast of Attica; 13 miles long, and 8 broad. It is fertile, producing fruit, wine, honey, and valonia. Pop. about 5000, most of whom belong to Zea, the capital.

Zealand, or **SEELAND**, the largest of the Danish islands, separated from Sweden by the Sound and from Funen by the Great Belt; length, 81 miles, breadth, 65. It produces large crops of corn, and has excellent pasture. It contains the capital of Denmark, Copenhagen. Pop. 960,000.

Zebra, the *Equus* or *Asinus zebra*, a quadruped of Southern Africa, nearly as large as a horse, white, striped with numerous brownish-black bands on the head, trunk, and legs, except on the belly and inside of the thighs. The zebra is extremely difficult to approach, from its watchful habits and great swiftness of foot. Only in a few instances has it been domesticated. The name has been sometimes applied to the now extinct quagga and the dauw or Burchell's zebra; but they differ from the zebra in having no stripes on the lower limbs, while those on the body are not so black as the true zebra's. The zebra is said to be nearly extinct. See *Dauw*, *Quagga*.

Zebu, a ruminant of the ox tribe, the *Taurus indicus* or *Bos indicus*, called also Brahman bull. This quadruped differs from



Zebu (*Taurus indicus*).

the common ox in having one, or more rarely two, humps of fat on the shoulders, and in having eighteen caudal vertebrae instead of twenty-one. It is found extensively in India, and also in China, Japan, and Africa. Zebras are used as beasts of draught and burden, and occasionally for riding. Their flesh is eaten as an article of food, especially the hump, which is esteemed a great delicacy.

Zebu. See *Cebu*.

Zebulun was the tenth son of Jacob, and gave his name to one of the twelve tribes of

Israel, and to a region of Palestine. At the first census the tribe numbered 57,400, and 60,500 at the second. The territory of the tribe lay in the fertile hilly country to the north of the plain of Jezreel, and included Nazareth.

Zechari'ah, or **ZACHARIAH**, the eleventh of the minor prophets, is supposed to have been born in Babylon, and to have been in the first detachment of the exiles who returned to Jerusalem under Zerubbabel and Joshua. He began to prophesy in the second year of Darius Hystaspes, and with his senior contemporary, the prophet Haggai, contributed powerfully by his appeals to the rebuilding of the temple (Ezra vi. 14). Chapters i.-viii. of the prophecies of Zechariah are generally admitted to be his composition. But the two other sections of the book into which critics and commentators have divided it, chapters ix.-xi. and xii.-xiii., have been ascribed by many to a pre-exilic author, partly because both what is said and is not said in them is regarded as irreconcilable with a post-exilic one.

Zedeki'ah, the last king of Judah of the line of David. When he was twenty-one years of age Nebuchadnezzar appointed him to succeed his nephew Jehoiachin (whom he carried to Babylon) as king of Judah. He took an oath of allegiance to Nebuchadnezzar, which he afterwards broke by entering into an alliance with Egypt. His conduct in so doing was denounced by the prophet Jeremiah, who, as well as Ezekiel, then in Chaldaea, predicted the approaching fall of Jerusalem, which was besieged by Nebuchadnezzar and taken, B.C. 588. Zedekiah, whose sons were killed in his presence, had his eyes put out, and was carried to Babylon, where probably he died.

Zedoary (*Curcuma Zedoaria*), a plant of the order Zingiberaceae, distinguished, like ginger, for the stimulating and aromatic properties of the root. It is a native of India and China. The roots of several other species are sold under the same name.

Zealand, **ZEALAND**, or **SEELAND**, the most westerly province of Holland, has the greater part of its surface below the sea-level, and protected by dikes. The soil is fertile, producing rich crops of wheat, flax, and hemp, and much dairy produce is exported. The capital is Middleburg. Area, 689 square miles; pop. 217,329.

Zeijst, **ZEIST**, or **ZEYST** (zist), a village of Holland, in the province of Utrecht, and 6 miles east of Utrecht. It has a Moravian

establishment, with manufactures of porcelain, soap, and candles. Pop. 6372.

Zeilah, a seaport of East Africa, on the Somali coast and Gulf of Aden, about 100 miles south of the Strait of Bab-el-Mandeb, since 1885 under British rule. Pop. 15,000.

Zeitz (tsits), a town of Prussia, in the province of Saxony, has manufactures of woollens, cottons, &c., and in its neighbourhood are mineral-oil works. Pop. 30,568.

Zemindar (zem-in-där'), in India, the title of a class of officials created under the Mogul government of India. They have been regarded, first, as district governors; second, as landed proprietors, and third; as farmers or collectors of the government revenue on land. At the present day, in Bengal, the zemindar has all the rights of a British landed proprietor, subject to the payment of the land-tax, and also to a certain ill-defined tenant-right on the part of tenants who have long held possession of their farms.

Zena'na, the name given to the portion of a house reserved exclusively for the females belonging to a family of good caste in India.

Zend, an ancient Iranian language, in which are composed the sacred writings of the Zoroastrians. It is a member of the Aryan family of languages, and very closely allied to Sanskrit. See next article.

Zend-Avesta, the collective name for the sacred writings of the Guebers or Parsees, ascribed to Zoroaster, and revered as a bible, prayer-book, and sole rule of faith and practice. It consists of several divisions, of which the oldest is written in the primitive Zend language. This partly consists of *gāthās* or songs, some of which may contain the actual words of Zoroaster, and are valuable as containing the doctrines he taught. An English translation of the Zend-Avesta has been published.

Zengg, a seaport town of Austria, on the Adriatic. Pop. about 5000.

Zenith, the vertical point of the heavens at any place, that is, the point right above a spectator's head, and from which a line drawn perpendicular to the plane of the horizon would, if produced, pass through the earth's centre, supposing the earth a perfect sphere. Each point on the surface of the earth has therefore its corresponding zenith. The opposite pole of the celestial horizon is termed the *nadir*. (See *Nadir*.) The zenith distance of a heavenly body is the arc intercepted between the body and the zenith, being the same as the co-altitude of the body.

Zenjun, town of Persia, in the province of Irak-Ajemi, with manufactures of carpets, woollen cloths, and arms. Pop. 15,000.

Zeno, was emperor of the East from 474 to 491 A.D. One of the chief events of his reign, which was full of vicissitudes, was the permission given by him to Theodoric to dethrone Odoacer, which led to the establishment of the Ostrogothic kingdom in Italy.

Zeno, OF CITIUM, in Cyprus, where he was born, founder of the Stoic school of philosophy, flourished in the first half of the 3d century B.C. Settling in Athens he attached himself to various philosophical sects in succession, until he instituted a doctrine of his own. He taught in the Stoa, a porch adorned with the pictures of Polygnatus, whence his followers were called Stoics, and were sometimes designated 'disciples of the porch.' His writings are all lost. In his ethical system the nature of moral obligation was recognized as unconditional, virtue as the only good, and vice, not pain, as the only evil. Developed by his successors, Stoicism became the creed of the noblest of the Romans until Christianity was generally accepted. (See *Stoics*.) The date of his death is uncertain.

Zeno, OF ELEA, an early Greek philosopher, is supposed to have been born about the beginning of the 5th century B.C. He taught philosophy at Athens, and Pericles is said to have been one of his pupils. He was a favourite disciple of Parmenides, and is introduced as discussing philosophy with his master in Plato's dialogue of that name. He sought to recommend Parmenides's doctrine of the one by controverting the popular belief in the existence of the many.

Zeno'bia, Queen of Palmyra, was the wife of its king Odenathus, and accompanied him both in war and in the chase. Gallienus, in return for his services, acknowledged Odenathus as colleague, and when her husband was murdered, 267 A.D., she assumed the sovereignty, conquered Egypt, and called herself Queen of the East. Her ambition provoked the emperor Aurelian to make war on her, and after a stubborn resistance she fell into his power (273 A.D.), and was made to grace his triumph. She was allowed to pass the remainder of her life as a Roman matron. Zenobia was a woman of great courage, beauty, and linguistic accomplishments, and her studies were directed by Longinus.

Zeolite (zē'ō-lit), a generic name of a number of minerals which fuse under the

blowpipe. They are hydrated double silicates, of which the principal bases are aluminum and calcium.

Zephaniah (zef-a-n'ā), the name of one of the books of the Bible, the work of the ninth in order of the minor prophets, who lived in the reign of Josiah, and who probably uttered his prophecies some time between 630 and 624 B.C. The subjects of his prophecy are the temporary desolation of Judea, the destruction of the Philistines, Moabites, Ammonites, Assyrians, &c., and the promise that God will effect the restoration and felicity of a righteous remnant.

Zephyr, **ZEPHYRUS** (zef'ēr, zef'i-rus), the west wind; and poetically, any soft, mild, gentle breeze. The poets personify Zephyrus, and make him the most mild and gentle of all the sylvan deities.

Zeraf'shan, a former administrative district of Russian Turkestan, watered by the river of the same name. In 1887 the district was united with a part of the province of Sir-daria to form the present province of Samarkand, with a capital of the same name. The province is mainly mountainous, and is watered by the river Zeraf'shan, which flows westwards past Samarkand and Bokhara towards the Amu-daria.

Zerbst (tserpst), a town in the German duchy of Anhalt, on the Nuthe, 21 miles south-east of Magdeburg, is the seat of several manufactures. Pop. 17,094.

Zerda, the fennec (which see).

Zerdusht. See *Zoroaster*.

Zere'ba, **ZAREEBA**, a word which came into notice in 1884 during the British military operations in the Soudan, to denote an inclosure, the sides of which are protected by prickly brushwood from a sudden surprise of the enemy; a fenced encampment.

Zero, in physics, any convenient point with reference to which quantitatively estimable phenomena of the same kind are compared; such as the point of a graduated instrument at which its scale commences; the neutral point between any ascending and descending scale or series, generally represented by the mark 0. In thermometers the zero of the Centigrade and Réaumur scales is the freezing-point of water; in Fahrenheit's scale, 32° below the freezing-point of water. (See *Thermometer*.) *Absolute zero* is -273° C., or 273° C. below the freezing point of water, at which temperature any given body is supposed to contain no heat.

Zetland. See *Shetland*.

Zeuglodon (zū'glo-don), an extinct genus of marine mammals, regarded by Huxley as intermediate between the true cetaceans and the carnivorous seals. They belong to the Eocene and Miocene, and *Z. cetoides* of the Middle Eocene of the United States attained a length of 70 feet.

Zeulenroda (tsoi'-), a town of Central Germany, principality of Reuss-Greiz. Pop. 9420.

Zeus (zūs), in mythology, the supreme divinity among the Greeks; the ruler of the other gods; generally treated as the equivalent of the Roman Jupiter. He was the son of Cronos and Rhea, brother of Poseidon (Neptune) and Hera (Juno), the latter of whom was also his wife. He expelled his father and the dynasty of the Titans, successfully opposed the attacks of the giants and the conspiracies of the other gods, and became chief power in heaven and earth. See *Jupiter*.

Zeuss (tsois), JOHANN KASPAR, born 1806, died 1856, a native of Bavaria, may be said to have founded Celtic philology with the publication in 1853 of his great work the *Grammatica Celtica*. In his later years he was a professor at the Bamberg Lyceum.

Zeuxis, a celebrated Greek painter, who flourished about 420-400 B.C., and latterly lived in Ephesus. He belonged to the Asiatic school of painting, the distinguishing characters of which were accurate imitation and the representation of physical beauty. One of his most famous works was a picture of Helen. He was a contemporary of the painter Parrhasius.

Zibet, **ZIBETH** (zib'et), *Viverra zibetha*, an animal of the same genus as the civet-cat. It is found in Eastern Asia, and in some of the larger islands of the Indian Archipelago. It secretes an odoriferous substance which resembles that of the civet. It is often tamed by the natives of the countries where it is found, and it inhabits their houses like a domestic cat. See *Civet*.

Zif, **ZIFE**, the second month of the Jewish sacred year, extending from the new moon in May (or according to some rabbis in April) to that in June.

Zilleh (ancient, *Zela*), a town of north-eastern Asia Minor, 39 miles south-west of Tokat; with some manufactures, and an annual fair attended by from 40,000 to 50,000 persons. Pop. 15,000.

Zimapan, a town of Mexico, state of Hidalgo, with gold, silver, and lead mines. Pop. 15,258.

Zimmermann (tsim'ér-mán), JOHANN GEORG, an eminent physician and miscellaneous writer, was born in 1728 at Brügg, in the Swiss canton of Bern. At the University of Göttingen he studied under and was befriended by Haller, and eventually was appointed public physician to his native town. He became famous in his profession, and published several works on miscellaneous subjects, with one on Experience in Medicine, which procured him the appointment of physician for Hanover to George III. The loss of his wife and other domestic calamities brought on an attack of hypochondria, from which a second marriage relieved him, and as a result of his recovery he produced his once celebrated treatise on Solitude (1784), by which out of his own country he is alone remembered. In 1786 he attended Frederick the Great in his last illness, about whom he published two works, one of them Conversations with the King, which involved him in painful controversy. Latterly he became mentally deranged, and died in 1795. His autobiography was issued in 1791.

Zinc, one of the common metals; symbol Zn, atomic weight 65.4. Commercially it is known as *spelter*. It has a bluish-white colour, a high metallic lustre, and a crystalline texture. Its specific gravity is about 7; it is relatively hard, and at the ordinary temperatures brittle; between 100° and 150° C. it becomes softer, and can then be rolled into foil or drawn into wire, and then retains its malleability; but at 200° it is again very brittle. It melts at 433° C., and when slowly cooled crystallizes in four- or six-sided prisms. Zinc undergoes little change by the action of air and moisture. When fused in open vessels it absorbs oxygen, and forms the white oxide called *flowers of zinc*. Heated strongly in air it takes fire and burns with a beautiful white light, forming oxide of zinc. Zinc is found in Germany, the U. States, France, Italy, Belgium, Spain, Sweden, &c. It does not occur native, but is obtained from its ores, which are chiefly the sulphide, or *zinc-blende*, and the carbonate, or *calamine*. The oxide of zinc (ZnO) is a fine white powder, insoluble in water, but very soluble in acids, which it neutralizes, being a powerful base of the same class as magnesia. It reacts with both acids and alkalis, generating hydrogen. Several of the salts of zinc are employed in medicine and the arts; the sulphate, $\text{ZnSO}_4 \cdot 7 \text{H}_2\text{O}$, or white vitriol, is used in calico printing, and in

medicine as an astringent, a caustic, an emetic, and a tonic; the oxide and the carbonate, ZnCO_3 , are used as pigments, &c. Sheet-zinc is largely employed for lining water cisterns, baths, &c., for making spouts, pipes, for covering roofs, and other purposes. Plates of this metal are used as generators of electricity in voltaic batteries, &c.; they are also employed in the production of pictures, &c., in the style of woodcuts. (See *Zincography*.) Zinc is much employed in the manufacture of brass (see *Brass*) and other alloys, and in preparing galvanized iron. (See *Galvanized Iron*.) *Zinc dust* is a fine powder consisting of free zinc together with its oxide, and is deposited in the flues during the distillation of zinc.

Zinc-blende, native zinc sulphide, ZnS , one of the chief zinc ores. It usually occurs with lead sulphide, and often contains iron. See *Zinc*.

Zincography (zing-kog'ra-fi), an art in its essential features similar to lithography, the stone printing-surface of the latter being replaced by that of a plate of polished zinc. A form of this art called anastatic printing is described under *Anastatic*.

Zinc-white (ZnO), oxide of zinc, a pigment now largely substituted for white-lead as being less liable to blacken on exposure; but it has not an equal covering power.

Zingarelli, NICCOLO ANTONIO, Italian composer, born in 1752. After much success as a composer, both of operas and of sacred music, in 1804 he was appointed chapel-master of the Sistine chapel in Rome, and on refusing to compose a Te Deum on Napoleon I. making his son king of Rome, he was arrested and taken to Paris, but was immediately liberated and pensioned by the emperor, who was a great admirer of his music. When he died in 1837 he was director of the Royal College of Music at Naples, and chapel-master of the Neapolitan Cathedral. Among his chief operas were *Montezuma* and *Romeo and Juliet*.

Zingis Khan. See *Genghis Khan*.

Zinzendorf (tsin'tsen-dorf), NICHOLAS LUDWIG, COUNT VON, founder of the community of Moravian Brethren, or Herrnhuters, was born at Dresden in 1700. After studying law at Wittenberg, and several years of foreign travel, he resolved to settle down as a Christian land-owner among a pious tenantry, and while carrying out this intention he worked assiduously in co-operation with congenial friends at creating a revival of religion

in the Lutheran Church. Having given an asylum on his estate to some persecuted religionists from Moravia, and built for them the village of Herrnhut, he settled among them, and by degrees established there a common worship, and a missionary and industrial organization based on the family, not on the monastic system. This association became known throughout the world as the Moravian Brethren (which see). To the extension of its influence Zinzendorf devoted his fortune and his energies, visiting in the course of his journeys England and America. He died in 1760.

Zinzibera'ceæ, ZINGIBERA'CEÆ, a natural order of plants, of which the genus *Zinziber* (ginger) is the type. The species are all tropical plants, or nearly so, the greater number inhabiting various parts of the East Indies. They are generally of great beauty through the development of their floral envelopes and the rich colours of their bracts; but they are chiefly valued for the sake of the aromatic and stimulating properties of the rhizome or root, found in ginger, galangal, zedoary, cardamoms, &c.

Zion, a mount or eminence in Jerusalem, the royal residence of David and his successors. See *Jerusalem*.

Zircon (Zr O_2 , Si O_2), a mineral, silicate of zirconium, originally found in Ceylon, and forming one of the gems, being met with either colourless or coloured—red, brownish, green, &c. Hyacinth and jargon are varieties.

Zirconia (Zr O_2), the oxide of zircon, a hard white solid, 'sticks' of which are sometimes used in the oxyhydrogen flame instead of lime.

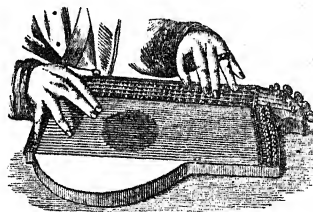
Zirconium, the metal contained in zircon and certain other rare minerals; symbol Zr; atomic weight 90.6. It is closely related to titanium and silicon.

Zirknitz, or **CZIRKNICZ**, a lake of Austria, in Carniola, 30 miles E.N.E. of Trieste, about 5 miles long and between 2 and 3 broad, without surface-outlet. It is remarkable for the occasional disappearance of its waters for weeks and even months, during which its bottom is often covered with luxuriant herbage. Its bed is composed of limestone, and full of deep fissures and caverns through which the waters disappear, returning when the rain sets in.

Ziska, **JOHN**, leader of the Hussites, was born about 1360 in Bohemia. He joined as a volunteer the Knights of the Teutonic Order, and fought against the Poles, as also with

the Hungarians against the Turks. He is also said to have fought on the English side at the battle of Agincourt. He threw in his lot with the militant reformers who took arms after the martyrdom of Huss and Jerome in Bohemia, and became their leader; established himself at Mount Tabor, which he fortified, and where a town grew up occupied by his followers, who thence subsequently took the name of Taborites. From boyhood blind of an eye, he lost the other at the siege of Raby, but he continued to direct the operations, and his forces achieved the most signal successes by defeating a powerful army of imperialists at Deutschbrod. While engaged in the siege of Przibislaw he was carried off by the plague, October 1424.

Zither, Zithern (tsit'ér, tsit'érn), a stringed musical instrument consisting of a sound-box pierced with a large circular sound-hole near the middle, the strings, to the number



Zither.

of thirty-one in the more perfect forms of the instrument, being made of steel, brass, catgut, and silk covered with fine silver or copper wire, and tuned by pegs at one end. Five of the strings are stretched over a fretted keyboard, and are used for playing the melody, the fingers of the left hand stopping the strings on the frets, the right-hand thumb armed with a metal ring, striking the strings. These strings, which are tuned in fifths, have a chromatic range from C in the second space on the bass staff to D on the sixth ledger-line above the treble. All the remaining strings, called the accompanying strings, are struck by the first three fingers of the right hand, and being unstopped produce only the single tone to which they are tuned. The instrument while being played rests on a table with the key-board side nearest the performer.

Zittau (tsit'ou), a town of Saxony, in the district of Bautzen, on the Mandau, 48 miles E.S.E. of Dresden, is the centre of the manufacture of mixed cotton and woollen stuffs

in Saxony; manufactures also woollens, cottons, trimmings, &c., and has bleach-fields, dye-works, machine-works, tile-works and potteries, royal institute of glass-painting, &c. There are a number of lignite-mines worked in the neighbourhood. Pop. 34,719.

Zlatoust, a town of Russia, government of Ufa, among the Ural Mountains, on the banks of the Ai, which supplies with motive power the crown iron-works. It has manufactures of swords, bayonets, fire-arms, and ordnance. Pop. 19,000.

Znaim (tsnim), a town of Moravia, on the Thaya, has manufactures of earthenware, leather, chocolate, &c. Here in 1800, after the battle of Wagram, an armistice was concluded between Napoleon I. and the Archduke Charles. Pop. 16,239.

Zoan, the Tanis of the Greeks and Romans, an ancient Egyptian city, on the right bank of what was the Tanitic bank of the Nile, now only a canal. It was probably the residence of the Pharaoh of the Exodus, and consequently the scene of the 'marvellous things' that were done 'in the field of Zoan' (Ps. lxxxviii. 12). The temple was one of the grandest in Egypt. Its ruins, buried under mounds, have been explored, and one of the chief curiosities found in them is the Canopus stone, with a trilingual inscription, like that on the Rosetta stone, hieroglyphic, demotic, and Greek, recording a decree of Egyptian princes assembled at Canopus B.C. 254.

Zoantha'ria, an order of the class Actinozoa, represented by the sea-anemones and by the great bulk of the coral-polyps.

Zo'diac, an imaginary belt or zone in the heavens, extending about 9° on each side of the ecliptic. It is divided into twelve equal parts called signs. It was marked out by the ancients as distinct from the rest of the heavens because the apparent places of the sun, moon, and the planets known to them were always within it. This, however, is not true of all the planets. See *Ecliptic*.

Zodi'acal Light, in astronomy, a luminous tract of an elongated triangular figure, lying nearly on the ecliptic, its base being on the horizon, and its apex at varying altitudes, seen at certain seasons of the year either in the west after sunset or in the east before sunrise. It appears with greatest brilliance within the tropics, where it sometimes rivals the Milky Way. The most plausible hypothesis respecting it is that it consists of a continuous disc, probably of meteors revolving round the sun.

Zo'ea, the name given to an embryonic stage in the development of crustacea (which see).

Zoilus, a rhetorician of ancient Greece, born at Amphipolis, chiefly remembered for the asperity of his criticisms on the poems of Homer. The time at which he lived is uncertain—probably the 3d century B.C. His name is used proverbially as that of a captious or snarling critic.

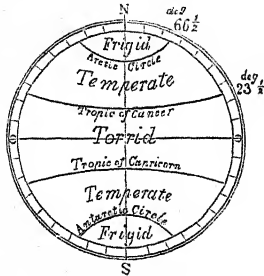
Zola, **EMILE**, French novelist, born in 1840, the son of an Italian engineer, died in 1902. After working for Paris publishers and writing for the press he attempted fiction. He first became generally known by commencing, in 1871, the famous series of novels entitled *Les Rougon Macquart Histoire Naturelle d'une Famille sous le Second Empire*. They were based on a theory that it is the duty of the modern novelist to depict human life, in all grades of society, exactly as it is, omitting and softening nothing, however repulsive and disgusting. Zola carried out this theory so effectually that English translations of several of these novels are not allowed to be sold. One of the series, *L'Assommoir*, portraying the evil consequences of drunkenness, was dramatized by Charles Reade as 'Drink,' and became popular. Among Zola's other novels are *Nana*, *Germinal*, *L'Œuvre*, *La Terre*, *La Bête Humaine*, *La Débâcle*, *Dr. Pascal*, *Lourdes*, *Rome*, *Paris*, *Récondité*.

Zollverein (tsol'vër-in), the German customs union, the precursor of the present German Empire, founded in 1827, and afterwards greatly extended through the efforts of the government of Prussia. Its principal object was the establishment of a uniform rate of customs duties throughout the various states joining the union. The territories of the Zollverein now coincide with those of the German Empire, and include also Luxembourg.

Zombor, or **SOMBOR**, capital of the Hungarian county of Bács-Bodrog, on a canal which unites the Theiss and Danube, about 120 miles south of Budapest, is the centre of the corn and cattle trade of an extensive district. Pop. 29,012.

Zona'ras, **JOANNES**, Byzantine historian, flourished in the 12th century. His chief work is the *Chronicon*, a history extending from the creation of the world to A.D. 1118. Of the events of his own time his account is meagre; but his works contain valuable fragments from lost writings of earlier historians.

Zone, (1) in geography, one of the five great divisions of the earth, bounded by circles parallel to the equator, and named according to the temperature prevailing in each.



Zones of the Earth.

The zones are: the *torrid zone*, extending from tropic to tropic, or $23\frac{1}{2}^{\circ}$ north and $23\frac{1}{2}^{\circ}$ south of the equator; two *temperate zones*, situated between the tropics and polar circles, or extending from the parallel of $23\frac{1}{2}^{\circ}$ to that of $66\frac{1}{2}^{\circ}$ north and south, and therefore called the *north temperate* and *south temperate* zone respectively; and two *frigid zones*, situated between the polar circles and the north and south poles. (See *Climate*.) (2) In natural history, the name is given to any well-defined belt within which certain forms of plant or animal life are confined; as the different belts of vegetation which occur as we ascend mountains.

Zooid, in biology, an animal organism, not independently developed from a fertilized ovum, but derived from a preceding individual by the process either of fission or gemmation.

Zoological Garden, a public garden in which a collection of animals is kept. The gardens of the Zoological Society, Regent's Park, London (familiarily termed 'the Zoo'), founded in 1828, are probably the finest of the kind in the world. They belong to the Zoological Society of London, which was founded in 1826, among its promoters being Sir Humphry Davy and Sir Stamford Raffles. Of the other chief zoological gardens, the Jardin des Plantes in Paris is the oldest, having been founded in 1794.

Zoological Stations, stations or centres which have of late years been established in various parts of the world for the study of zoology. The Stazione Zoologica at Naples, founded mainly by Dohrn in 1872, is of an international character. Other institutions

of the same kind on a smaller scale have been established in various parts of France, Russia, America, and Scotland.

Zoology (Gr. *zōon*, an animal, and *logos*, discourse), that science which treats of the natural history of animals, or their structure, physiology, classification, habits, and distribution. The term 'natural history' has been frequently used as synonymous with zoology; but such a term is obviously of wider significance, and should be used to indicate the whole group of the natural sciences. Zoology is a branch of biological science, constituting, in fact, with its neighbour branch botany, the science of biology. Its study comprehends such branches as the *morphology of animals*, or the science of form or structure, which again includes *comparative anatomy*, by which we investigate external and internal appearances, the positions and relations of organs and parts; the *development of animals*, which treats of the various stages leading from the embryonic to the mature state; the *physiology of animals*, which includes the study of the functions of nutrition, reproduction, and of the nervous system; *classification* or *taxonomy*, which assigns to the various individuals their proper place in the scale of life. A new department has been added in recent times, sometimes called *etiology*, which investigates the origin and descent of animals, or treats of the evolutionary aspect of zoological science. Various systems of classification have been framed by zoologists. Linnæus divided the animal kingdom into six classes, viz. Mammalia, Birds, Fishes, Amphibia, Insects, and Worms (Vermes). Cuvier proposed a more scientific arrangement. He divided the animal kingdom into four subkingdoms, viz. Vertebrata, Mollusca, Articulata, and Radiata. Modern classifications have been based chiefly on morphological characters, with the addition of the study of cellular embryology, and the facts of heredity and adaptation. They have been very largely influenced by the theory of evolution, which has induced many naturalists to arrange animal forms as nearly as possible on the lines of descent from which they are believed to have originated. Among those who have modified the classification of Cuvier may be noted Lamarck, Ehrenberg, Owen, Milne-Edwards, Von Siebold, Leuckart, Agassiz, Huxley, Haeckel, Müller, Dohrn, Ray Lankester, and others. Professor Huxley recognizes the following subkingdoms: Vertebrata, Mollusca, Mollus-

coida, Annulosa, Annuloida, Cœlenterata, Infusoria, and Protozoa. Hæckel's classification gives the broad divisions—Vertebrata, Arthropoda, Echinodermata, Mollusca, Vermes, Zoophyta, and Protozoa.

Zoophyte (zō'ō-fit; Gr. *zōon*, an animal, and *phyton*, a plant), the name given by Cuvier to any member of his sub-kingdom Radiata. It is now loosely applied to animals of extremely low organization which present many external resemblances to plants.

Zoospore (zō'os-pōr), a spore occurring in cryptogamic plants, which, having cilia or



Zoospores

long filiform moving processes projecting from its surface, moves spontaneously for a short time after being discharged from the spore-case of the parent plant.

Zoroaster (Old Persian *Zarathustra*, later Per. *Zerdusht*), one of the great religious teachers of the East, the founder of what was for centuries the national religion of Persia, and is still adhered to by the Parsees. He has been represented by eminent authorities as purely mythical, but it seems more reasonable to believe that he was a real and historical personage. If this view be accepted, he was probably a native of the east of Iran, but there is great uncertainty as to the time in which he appeared as a religious teacher. He is supposed by some to have been a contemporary of Moses, by others his date is assigned to the 10th century before Christ. His doctrines are to be found in the Parsee scriptures called the Zend-Avesta (which see), and the Gāthās, which is the oldest part of that work, are declared to contain his authentic utterances. The fundamental idea of his doctrine was the existence, since the beginning, of a spirit of good, Ahurō Mazdaō (Ormuzd), and a spirit of evil, Angrō Mainyush (Ahriman). These two are in perpetual conflict, and the soul of man is the great object of the war. Ormuzd created man free, so that if he allows himself to fall under the sway of Ahriman he is held to be justly punishable. When he dies his good and evil deeds will be weighed against each other, and accordingly as the balance is struck will be sent to heaven or to hell.

If they are exactly equal, the soul passes into an intermediate state, and remains there until the day of judgment. Ormuzd is to triumph ultimately, and then there will be one undivided kingdom of God in heaven and on earth. The religion of Zoroaster, when it became that of Iran, was expounded by a widely-spread priesthood, and these provided for it a ritual and ceremonial. Minutely elaborated laws for the purification of soul and body were laid down. They included a prohibition of the burning or the burying of the dead bodies of believers, which, by the Parsees in Bombay and elsewhere, are still left to be devoured by vultures. See *Fire-worshippers*, *Guebres*, *Parsees*.

Zorrilla y Moral, DON JOSE, Spanish dramatist and poet, born at Valladolid 1817. He was intended for the law, but devoted himself instead to literary pursuits. In 1841 he published *Songs of the Troubadours*; this was followed by a collection of *Historical Legends and Traditions*; several volumes of poems, comedies, &c., all of which were very popular. He died in 1893.

Zo'simus, a Greek historian, who held an official post at Constantinople during the first half of the 5th century A.D. He was a pagan, and in his history of the then empire he severely criticised the Christian emperors, representing the substitution of Christianity for paganism as largely responsible for the decline of the empire.

Zouaves (zwä'vz), originally mercenaries belonging to a Kabyle tribe. The Zouaves in the pay of the Dey of Algiers were, when Algeria became a French possession, incorporated with the French army there, preserving their Arab dress. Ultimately the native element was eliminated, and the Zouaves became merely French soldiers in the picturesque Arab costume. As such they distinguished themselves in the Crimea and the Franco-Italian war of 1859.

Zschokke (tshok'kē), JOHANN HEINRICH DANIEL, German author, born at Magdeburg in 1771, died in 1848. He settled in Switzerland, in which country he held an honoured position in connection with education and public affairs, and with the press. His autobiography, several of his tales, and the *Hours of Devotion* (*Stunden der Andacht*), have been translated into English.

Zschopau (tsho'pou), a town of Saxony, on a river of same name, 6 miles south-east of Chemnitz; has important manufactures of woollens, cottons, &c. Pop. 7991.

Zuccherò (dzuk'e-rò), or **ZUCCARO** (dzuk'ä-rò), **TADDEO** and **FEDERIGO**, two brothers, Italian painters of the 16th century, were chiefly noted in their own country for their fresco-paintings. **Federigo**, the younger of the two, came to England in 1574, and received commissions to paint the portraits of high personages, among them those of Queen Elizabeth and Mary Queen of Scots. His portrait of the latter was engraved by **Vertue**.

Zug (tsöh), a central and the smallest undivided canton of Switzerland, bounded by **Zürich**, **Schwyz**, **Lucerne**, and **Aargau**; area, 92 square miles. The surface, mountainous in the south-east and south, where the **Rosberg** occupies the frontier, slopes more or less gradually north and west, till it becomes comparatively flat. The only lakes deserving the name are those of **Zug** and **Egeri**. The climate, rigorous in the mountainous districts, is mild on the lower south slopes. The chief exports are cattle, fruits, cider, and 'kirschwasser.' Area, 923 sq. miles; pop. 25,045.—**ZUG**, the capital, stands on the north shore of the lake, is 12 miles north-east of **Lucerne**, with which and with **Zürich** it is connected by railway. Pop. 6508.—**LAKE OF ZUG**, or **ZUGERSEE**, chiefly in the canton of **Zug**, 9 miles long north to south, and in breadth from 3 miles to 1 mile. The shores are low in all directions except the south and south-east. In the former direction the **Rigi** with **Mount Pilatus** towering behind it, and in the latter the **Rosberg**, rise in lofty precipices, presenting scenery of a grand description. At the foot of the **Rosberg** the lake is 1200 feet deep. The fishing, principally pike and carp, is productive.

Zuider-(or **ZUYDER**) **Zee** (zoï'dèr-zä; 'South Sea'), a gulf of the North Sea, on the coast of Holland; 80 miles long, 40 miles greatest breadth. It was formerly a lake, but was united with the German Ocean by inundations in the 12th and 13th centuries. The islands **Texel**, **Vlieland**, **Terschelling**, **Ameeland**, &c., separate it from the North Sea, with which it communicates by various channels, the principal being **Hellsdeur** (Hell-gate), between the **Helder** and **Texel**. It is very shallow, and to avoid the difficulties of its navigation to **Amsterdam** the North Holland Canal was constructed. There is a proposal to inclose certain areas of it by means of dams or dikes, and by pumping and drainage to add much reclaimed land to the country.

Zuinglius. See **Zwingli**.

Zu'land, a South African territory north-east of **Natal**, and under its government. Inland it is bounded chiefly by **Natal**, the **Tugela** being the southern boundary; on the north it has **Tongaland**, on the east the Indian Ocean. The southern portion of the country consists chiefly of undulating plains, covered with grass, and thinly wooded. The coast region is flat, marshy, and very unhealthy. The inland region is healthy and rich in tropical productions. The **Zulus** are a warlike Kafir tribe, and for a time were formidable to the colonists of **Natal**, possessing an organized army of considerable numbers. In 1879, under their king **Cetewayo**, they came into conflict with the British. (See *Cetewayo*.) At first the war was unfortunate for the British (a body of troops having been annihilated at **Isandula**), but in July 1879 a general engagement took place at **Ulundi**, where the power of the **Zulus** was quite crushed. The subsequent British reorganization of **Zululand** did not work successfully, and in 1882 **Cetewayo** was restored, a strip of country adjacent to **Natal** being constituted as a 'reserve.' Into this reserve **Cetewayo** fled in 1883, after being defeated by a hostile Zulu chief, **Usibepu**, and there he died in 1884. However, **Cetewayo's** son **Dinizulu**, assisted by **Transvaal** Boers, vanquished **Usibepu**, and drove him into the reserve. Ultimately the Boers took possession of a considerable portion of the country, while the remaining portion of **Zululand**, with the reserve, was annexed by Britain in 1887. In 1897 it was incorporated with **Natal**, of which it now forms a 'province', being represented in the **Natal** parliament. There is a bishop of the Anglican church at **Eshowe**, and schools for natives at various places. The occupations of the inhabitants are chiefly the growing of maize and other cereals, and the rearing of cattle. The holding of land by Europeans is not permitted, except for missionary, trading, or mining purposes. The minerals are valuable and include gold and coal. The coast railway from **Durban** reaches the coal-fields. **Eshowe** is one of the chief centres. Area, 10,456 square miles; population, about 202,000.

Zumbo, a town of Portuguese East Africa, 450 miles from the mouth of the **Zambesi**, near the western point of the Portuguese territories on the **Zambesi**; has an advantageous site; was formerly the seat of an important trade, and contained a number of

substantial buildings; but of late trade was neglected, and the town fell into decay. The active development of this region may probably restore its importance.

Zumpt (tsymt), **KARL GOTTLOB**, born 1792, died 1849, professor of Roman literature in the University of Berlin, produced several excellent editions of Latin classics, and a valuable and elaborate Latin grammar, of which there have been several English editions.

Zürich (tsü'rik; ancient, *Turicum*), a town of Switzerland, capital of the canton of the same name, is beautifully situated at the northern end of the Lake of Zürich, on both sides of the Limmat, and having on the west the Sihl, which joins it immediately below. It has a university and a polytechnic school, both occupying handsome buildings, a Romanesque cathedral of the 11th-13th centuries, town-hall, public library, &c. Its most considerable industry is that of silk, but its cotton-spinning and manufacture of locomotives and machinery are also important. Its inhabitants are mainly German-speaking Protestants. Pop. (including suburbs), 180,843.—The canton holds the second place in the Swiss confederation as regards population. It is one of the northern cantons, and extends from the lake of the same name to the Rhine, to which its waters are carried by the Thur, Töss, Glatt, and Limmat. It is highly cultivated, and the land held by no fewer than 36,000 proprietors. There are extensive manufactures of silk and cotton goods. Area, 655 square miles. Pop. 431,036.

Zürich, LAKE OF, or **ZÜRICHSEE**, lies chiefly in the canton of Zürich, but partly in Schwyz. Its greatest length is about 27 miles; while its greatest breadth does not exceed 3 miles, and its greatest depth 600 feet. Its scenery is distinguished not so much for grandeur as for beauty. A considerable traffic is carried on upon the lake by means of sailing vessels and a number of steamers. It is well supplied with fish. Its chief feeder is the Linth Canal, communicating with the Wallenstatter-see. It discharges itself at the town of Zürich by the Limmat.

Zürich, TREATY OF, signed there 10th November, 1859, by the plenipotentiaries of France and Austria, embodied the conditions of the preliminaries of peace agreed to at Villafranca, on the part of Napoleon III. and the Emperor of Austria, Francis Joseph, and closed the Franco-Italian war

by Austria's abandonment of her right to Lombardy.

Zutphen, a fortified town of Holland, in the province of Gelderland, 20 miles by rail south of Deventer, has an active trade, especially in timber and grain. It is notable as being the scene of the death of Sir Philip Sidney, who was killed before its walls 1586. Pop. 18,400.

Zuyder-Zee. See *Zuider-Zee*.

Zvornik, a fortified town of Bosnia, on the Drina. Pop. 3500.

Zweibrücken (tsvi'brük-èn; Latin, *Bipontium*; French, *Deux-Ponts*, two-bridges), a town of Bavaria, in the Palatinate, pleasantly situated on the Schwarzbach; has manufactures of velvet, plush, cotton fabrics, &c., machinery, &c. The edition of the classics known by the name of 'Bipont' was published here. Pop. 13,713.

Zwickau (tsvik'ou), a town of Saxony, 60 miles W.S.W. of Dresden, with several fine churches, notably St. Mary (1453-1536), restored 1884; the fine Gothic 'Gewandhaus' (1522), now a theatre; town-house, government buildings, &c. The railway-station is one of the largest in Germany. Zwickau has manufactures of linen and cotton goods, dyes, and chemical products, &c.; productive coal-mines in the vicinity employ more than 8000 men. Pop. 68,502.

Zwingli, or (as it is often Latinized) **ZUINGLIUS, ULRICH**, the Swiss reformer, was born in the canton of St. Gall, where his father was a thriving peasant proprietor. Intended for the church, he studied at various places, during a second residence at Basel becoming the pupil and friend of Thomas Wytttenbach, a reformer before the Reformation, and from him learned the evangelical doctrines which he afterwards promulgated with signal success. His first overt revolt against the Roman Catholic system was when he was a priest at Einsiedeln (1516), which a supposed miracle-working image of the Virgin had made a favourite resort of pilgrims. He denounced the superstition of pilgrimages so effectively that his sermons were talked of in Rome, and it is said futile offers of promotion were made to bribe him into silence. In 1518 he was appointed preacher in the cathedral of Zürich, where he denounced and baffled a vendor of indulgences. Then followed other denunciations of Roman Catholic practices and doctrines, until Zürich, the authorities of which supported Zwingli, and the people of which adhered to him, became thoroughly Protestant,

and adopted a reformed theology, worship, and discipline. Zwingli went further than Luther, whose doctrine of consubstantiation led to what proved on the whole a resultless conference on the subject between him and Luther and Melancthon at Marburg in 1528. In 1531 the Forest Cantons, which adhered to the R. Catholic faith, made war upon Zürich, whose troops Zwingli accompanied as chaplain. While in the thick of an engagement at Kappel, near Zürich, he was mortally wounded, Oct. 11, 1531.

Zwolle (zwol'lè), a town of Holland, capital of the province of Overijssel. It is a well-built town, with fine suburbs and a fine church (St. Michael's), with a famous organ. Zwolle communicates with the sea by means of the Willemsvaart Canal. Among its industries are ship-building, cotton-manu-

facture, tanning, rope-making, &c. Three miles from the town is the monastery of the Agnetenberg, where Thomas à Kempis spent most of his life. Pop. 30,848.

Zygæna, or HAMMER-HEADED SHARK. See *Shark*.

Zymotic Diseases, a name applied to epidemic and endemic, contagious diseases, because they are supposed to be produced by some morbid principle acting on the system like a ferment (Greek *zymè*). This morbid principle or poison gets into the blood in minute particles or germs, which there increase and multiply, the disease lasting until the poison has become worked out, or has been destroyed. The chief of these diseases are measles, scarlet-fever, small-pox, typhus, typhoid, diphtheria, whooping-cough, croup, and erysipelas.

SUPPLEMENT.

Skegness, an urban district and seaside resort of England, in Lincolnshire, 13 miles N.E. of Boston, with fine sands. Pop. 2140.

Skelmanthorpe, an urban district of England, in Yorkshire (West Riding), 7 miles south-east of Huddersfield, with a manufacture of woollens. Pop. 3331.

Skelmersdale, an urban district of England, in Lancashire, 7 miles N.N.W. St. Helens, with collieries, &c. Pop. 5699.

Skerries, a name of various groups of small rocky islands off the British coasts.

Ski (skē), a sort of runner or shoe for sliding rapidly over surfaces of snow or ice, consisting of a strip of wood perhaps eight feet long and only a few inches broad. It is thickest in the middle, where it is secured to the foot by straps, and it is turned up at the fore end. Ski racing and jumping are national sports of Norway, and every year a great national competition is held near Christiania. Great speed can be attained on skis, and a jump of 120 feet is on record.

Sky. See *Heaven, Firmament, Clouds, Cyanometer, &c.*

Skye Terrier, a favourite small variety of terrier, with long, low body, erect or drooping ears, and a long, straight, drooping coat. In colour it may be blue, grey, or fawn. The extreme length, including the tail, is about 40 inches, and the greatest weight 20 lbs. See *Terrier*.

Slaithwaite, an urban district of England, in Yorkshire (W. Riding), on the Colne, 4 miles W.S.W. Huddersfield, with cotton and woollen manufactures and much-frequented mineral baths. Pop. 4763.

Slaughter-houses. See *Abattoir*.

Sleeping-sickness, a fatal disease common in Central Africa. Its chief characteristics are mental and physical lethargy and an irresistible tendency to sleep, with enlarged glands, wasting of the body, and convulsions. The disease may last for a

comparatively short period, or for several years, but, so far as is known, is invariably (or almost invariably) fatal. Recent investigations have traced its cause to the presence of a parasite of the genus *Trypanosoma* in the cerebro-spinal fluid and the blood, and it is stated that this parasite is communicated from one person to another by the bite of an insect, the *Glossina palpalis*, a species of tsetse-fly, and perhaps by others of the same genus. The disease seems to have originated on the Lower Congo, from which it has spread over a wide area, including Uganda. It has been estimated that during 1896-1906 from 400,000 to 800,000 African natives had died from it. There are a very few cases on record of Europeans suffering from it. Medical science has not yet discovered a remedy. The Royal Society sent out a special commission in 1902 to Entebbe, Uganda, where there is a special sleeping-sickness hospital. Monkeys are susceptible to the disease, and dogs and rats are partially susceptible.

Sleigh. See *Sledge*.

Sleswick, a form of *Schleswig*.

Sliding-scale, a scale for adjusting certain quantities in accordance with the variations of certain other related quantities; especially applied to former arrangements in Britain for raising or lowering import duties on corn according to the fall or rise in the market price (see *Corn-laws*); and to arrangements for modifying the rate of wages in an industry in accordance with changes in the market price of the commodity produced.

Slivno. See *Slieven*.

Small Holdings are distinguished from *allotments* (which see) by their greater size and by the circumstance that they constitute the main source of livelihood of those who cultivate them. The Allotments Acts limit allotments to one acre or less, but a small holding in the sense of the

Small Holdings Act of 1892 must exceed one acre but not exceed fifty acres, or, if it exceed fifty acres, it must have an annual value of not more than £50. The Act of 1892 empowered county councils to purchase land to sell or rent as small holdings. One-fifth of the purchase money was to be paid at the outset, and the rest by half-yearly instalments within fifty years. A fourth of the whole purchase money, however, might be secured by a perpetual rent charge. The Act has been a failure. Some landlords have met with considerable success—more particularly near towns—in their efforts to establish the small holdings system. A considerable part of the crown lands was offered for small holdings under an act of 1906, and in 1907 a Small Holdings and Allotment Act was passed, under which many such holdings have been allotted.

Smallthorne, an urban district of England, in Staffordshire, a mile north-east of Burslem, with an earthenware industry. Pop. 6263.

Smaragdite, a green foliated or fibrous variety of hornblende.

Smartweed, a name given to the water-pepper (*Polygonum hydropiper*) because of its acrid juice.

Smelling Salts, a preparation of ammonium carbonate with a sweet-scented oil, used in cases of faintness or to relieve nasal catarrh.

Smokeless Powder. See *Cordite*, *Gun-cotton*, *Rifle*.

Smoking. See *Tobacco*, *Ham*.

Soap-tree, the tree which yields the soap-berry (which see).

Söderhamn (*seu* *dér-håmn*), a seaport of Sweden, on a bay of the Gulf of Bothnia, 45 miles north of Gefle, with exports of iron and timber. Pop. 11,258.

Soke. See *Soc*.

Sola'num. See *Solanaceae*.

Sole Bay. See *Southwold* below.

Solenoid, a coil of insulated wire of copper or other conducting material whose ends are turned back within the coils and brought out together at the middle. When an electric current is passed through a solenoid it acts exactly like a bar magnet. If free to rotate horizontally, it comes to rest in the magnetic meridian, and if also free to revolve in a vertical plane, it assumes the same dip as a bar magnet.

Sombrerite, a natural variety of calcium phosphate, similar to apatite, found in some West Indian islands, and named

from the island of Sombrero. It is used as a fertilizer.

Soothill, UPPER and NETHER, two urban districts of England, in Yorkshire (W. Riding), about a mile north-east of Dewsbury. Pop. 6104 and 5552.

Sorbs. See *Slaves*.

Sorcery, divination by the assistance or supposed assistance of evil spirits. See *Magic*, *Witchcraft*, *Charm*, *Divination*.

Sore Throat, inflammation of the mucous membrane lining the parts at the back of the mouth and at the top of the gullet and windpipe, namely, the palate, uvula, tonsils, larynx, fauces, and pharynx. For one form of sore throat see *Quinsy*. Sore throat is often one of the manifestations of a general disease, such as scarlet fever or syphilis, or the result of an unhealthy diathesis, as in rheumatism and gout. 'Clergyman's sore throat' is due to excessive use of the voice, and demands a period of rest besides proper local treatment. In some forms of sore throat the uvula or the tonsils may require to be cut. Various gargles are found useful in cases of sore throat.

Sorus. See *Ferns*.

Soteriology, that branch of theology which treats of salvation through Jesus Christ. See *Atonement*, *Christianity*, &c.

Sothorn, EDWARD ASKEW, English actor, born in 1826, died in 1881. He began his career as an actor in Jersey. He played in New York for a time without much success until he was cast for the small part of Lord Dundreary in Tom Taylor's *Our American Cousin*. He elaborated the part, and scored a great success at the Haymarket Theatre, London, in 1861-63, the play being long highly popular. He was also successful in the title-rôle of Robertson's *David Garrick*.

Soto. See *De Soto*.

Sound. See *Swimming-bladder*.

South Africa Company, BRITISH. See *Chartered Companies in Supp*.

South African War (1899-1902). The immediate cause of this war was the refusal of the government of the South African Republic to grant a satisfactory franchise to the Uitlanders or Outlanders, that is, the British and other foreigners who had come to seek their fortune in gold-mining. For events preceding 1899, see *Transvaal*. Early in this year a petition from British residents in the Transvaal setting forth their grievances was forwarded by Sir Alfred (now Viscount) Milner, the high commissioner, to the home govern-

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ment. Prolonged negotiations followed, and latterly, as a reply to the offer of the British government (on 22nd Sept.) to formulate their own proposals for a final settlement, the government of the South African Republic, President Kruger being at its head, presented an ultimatum which could only mean war. In this document, delivered to the British agent in the Transvaal on Oct. 9, for answer within forty-eight hours, it was demanded that all matters in dispute should be settled by arbitration or in some other way to be agreed on; that all troops on the borders of the republic should be instantly withdrawn; that the reinforcements which had arrived in South Africa since 1st June should be removed from South Africa; and that the troops on their way to South Africa should not be landed. This ended the negotiations, and war at once followed, the Orange Free State, by a previous arrangement, joining the neighbouring republic.

The war was actually begun by the Boers invading Natal and Cape Colony, Ladysmith in the former and Kimberley and Mafeking in the latter being the places in which the greatest interest almost immediately centred. At first the British regular troops did not greatly exceed 20,000 in number, about half of them being in Natal under Sir George White, who had his headquarters at Ladysmith. On Oct. 20th (1899) the Boers who had invaded northern Natal endeavoured to cut off the British camp near Dundee, where General Symons was stationed with about 5000 men. They were repulsed at Talana Hill, but the British general was mortally wounded; and the following day they were more severely defeated at Elandslaagte by General French's force from Ladysmith. It was necessary, however, to withdraw the northern garrison to Ladysmith, and this was done—after the Boers had been beaten off by General White at Rietfontein. The enemy were now in such force that (with Joubert as commander-in-chief) Ladysmith was soon completely invested, the railway from the south being seized, as well as the bridge over the Tugela at Colenso. Fortunately several naval guns had been got into Ladysmith before this, which enabled its defenders to reply to the powerful artillery that the Boers had planted on the neighbouring heights. Swarming down into Natal the invaders overran the country as far as the Mooi River and beyond, and

it appeared that they might even attack Maritzburg; but the first army corps of 54,000 men reached South Africa in November, and General Sir Redvers Buller, who had arrived to take supreme command, took under his charge a large portion of this force, and so was able to drive the Boers back and prepare for the relief of Ladysmith. Other divisions of the reinforcements were despatched inland from Cape Town, Port Elizabeth, and East London to aid in checking the Boer advance into Cape Colony, and to open the way to Kimberley. The force which undertook the latter task was under the command of Lord Methuen, while General Gatacre was to operate against the Boers in the Stormberg district of the Cape Colony, General French being in command of a British force between the two. Advancing northward, Methuen drove the Boers from a strong position at Belmont, defeated them at Enslin, and on November 28 dislodged them from a strong position at the Modder River. Then followed a series of reverses to the British troops, which gained for a week in the first half of December the designation of the 'black week'.

On Dec. 10 General Gatacre attempted a night attack on a body of Boers strongly posted near Stormberg, but after a toilsome night march his men unexpectedly came upon the enemy's position, which they were unable to capture, and were driven back with heavy loss. On the same day General Methuen had shelled the Boers previously to attacking their position at Magersfontein. Early next morning, while marching to the attack, the Highland Brigade exposed itself to a close fire from the Boer trenches and lost very heavily, the commanding-officer, General Wauchope, being killed. The third and most serious reverse took place in Natal. On the 15th December General Buller attempted to force his way across the Tugela at Colenso, with the view of relieving Ladysmith. The plan entirely failed, the failure being aggravated by casualties amounting to over eleven hundred, while ten guns were abandoned to the enemy.

The British cabinet now decided to send out strong reinforcements, to call up the remainder of the army reserve, to incorporate a new yeomanry force, to allow twelve battalions of militia to volunteer for service abroad, to employ volunteers on active service, and to accept offers of help made by the colonies. Lord Roberts was in-

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structed to proceed to South Africa as commander-in-chief, with Lord Kitchener as chief of his staff. Lord Roberts and his staff arrived at Cape Town on Jan. 10, 1900, but before anything could be done by the new commander-in-chief, General Buller made another unsuccessful attempt against the Boer position at Colenso (11th January), an attempt associated with the name of Spion Kop. A third attempt was made to break through to Ladysmith on Feb. 5, but again the result was only disappointment. Meanwhile Lord Roberts had been making plans for more effectively dealing with the enemy, and had got together a strong cavalry force under General French between the Orange River and the Modder. General French advanced rapidly on Kimberley, and, in spite of all opposition, reached the place, dispersed the investing troops, and entered the town (16th Feb.). Soon after General Cronje was brought to a halt at Paardeberg, took refuge in the bed of the Modder, and held out for a week, but being completely hemmed in, he surrendered to General Roberts with over 4000 men (27th Feb.). Cronje and the rest of the prisoners were sent to St. Helena. Meanwhile fresh efforts were being made by Buller for the relief of Ladysmith, and this time with success. After a series of difficult operations, the Boer left was finally turned, and on February 28 Lord Dundonald rode into Ladysmith, being followed by General Buller two days later. Following on the successes in the west of the Orange State came successful operations by the generals in the northern parts of the Cape Colony—Gatacre, Clements, and Brabant. Bloemfontein now became General Roberts's objective, and after General Joubert had vainly attempted to bar his way at Poplar Grove, and again at Driefontein, the British commander entered the town practically without opposition (March 13). Kruger and Steyn (the Free State president) fled away to the north. The Free State was proclaimed British territory.

There was a long halt at Bloemfontein for various reasons; meanwhile enteric fever proved a terrible scourge, and the enemy were encouraged to fresh activity. Several mishaps now befell different bodies of British troops, and De Wet approved himself a leader of exceptional ability on the Boer side, while Louis Botha also gained distinction, having succeeded to the chief command on the death of Joubert (March

27). The advance northwards from Bloemfontein began on May 3, the British forces being under Generals Ian Hamilton, French, and Pole-Carew, with Lord Roberts at their head. No effective resistance was encountered, either on the Vaal or elsewhere. One after another the Boer positions were turned; Botha's troops evacuated Johannesburg, where the British flag was hoisted on May 31, and Pretoria was occupied on June 5. General Botha and a considerable body of men retired eastwards in the direction of the Portuguese frontier. The Boers were followed and beaten at Pienaarspoort. Meanwhile General Buller had been advancing northwards through Natal, and had entered the Transvaal, driving the Boers before him. On May 15 Dundee and Glencoe were retaken, on the 17th Newcastle, and by the end of the month he was encamped within striking distance of Majuba and Laing's Nek, which were strongly held by the enemy. But by a skilful turning movement General Hildyard secured command of the Boer positions, which were at once evacuated, and early in July the railway was open all the way to Pretoria from Durban. The total number of British troops in South Africa by the middle of the year amounted to about 250,000.

Shortly after the middle of May (1900) the Boers were driven from Mafeking, and the town entered by a British force from the south. The place had been invested from the 15th of October, when Cronje with a force of some 9000 men had marched to the attack. Fortunately it was well supplied with stores, and this, but much more the indomitable energy and resource shown by Colonel Baden-Powell, who commanded the small garrison, enabled it to hold out against all attempts of the enemy. In the end of July an important success was gained in the Orange River Colony by General Hunter, with the aid of Generals Rundle, Clement, Bruce-Hamilton, Paget and Macdonald. As the result of a combined movement, a force of some 4000 Boers under Prinsloo was surrounded by the British troops, and forced to surrender with guns, horses, and wagons. It had been hoped that De Wet would also be captured, but he, with 2000 men, succeeded in escaping. Advancing eastwards from the Pretoria district Lord Roberts joined hands with Buller, and from his headquarters at Belfast issued a proclamation annexing the Transvaal to the British do-

minions (Sept. 1). On October 6 General Buller left for England; on the 20th President Kruger slipped away to Europe on board a Dutch man-of-war. Lord Roberts left for home before the end of the year, handing over the chief command to Lord Kitchener.

The war had now entered upon what might be called the guerrilla stage, during which the activity and daring of such leaders on the Boer side as Botha and De Wet gave plenty of hard work to the British troops. Looking for support from their kinsmen in the Cape Colony and Natal, and still hoping for the intervention of some European power, the Boer leaders planned two enterprises which they thought might yet retrieve their cause. Botha, with some 6000 men, was to make a sudden dash into Natal, and raid the country, if possible, all the way down to Durban, while De Wet was to execute a similar movement in the direction of Cape Town. These attempts were made in the early part of 1901. Botha's plan was completely frustrated by a great sweeping movement of General French; the Boers were dispersed with the loss of guns, wagons, and immense numbers of cattle and sheep. De Wet fared no better, but, like Botha, he himself escaped capture, though losing guns, ammunition, and wagons. To checkmate the Boer system of warfare Lord Kitchener resolved to clear the country of food and cattle so as to deprive the enemy of supplies, to protect the railways by chains of blockhouses, to carry similar chains across the country in suitable directions, and to keep the Boers perpetually on the move by mobile columns of British troops. His measures were found exceedingly effective in the long run, but they entailed the gathering together of great multitudes of Boer women and children into the so-called 'concentration camps'.

A discussion regarding terms of peace took place between Lord Kitchener and General Botha on March 28, 1901, but nothing came of it. After this the gradual wearing down of the Boer resistance went on, and by the end of May the enemy had lost practically all their artillery. By the end of the year there had been put out of action some 53,000 Boers, of whom over 40,000 were in concentration camps, or in St. Helena, Ceylon, India, Bermuda, or elsewhere. After some great 'drives' organized by Lord Kitchener and carried out in the early part of 1902, which resulted

in the surrender of many burghers, and owed their success largely to the block-house system, negotiations for peace were at last entered on (March 28), though military operations were not suspended. On May 15 a conference of Boer representatives met at Vereeniging to consider terms of surrender. It was not till the last day of the month, however, that peace was absolutely secured, the agreement being signed at Pretoria by Lords Kitchener and Milner and the chief civil and military representatives of the Boers. The main points were: that the Boer forces should immediately lay down their arms and hand over all guns, rifles, and munitions of war; that burghers in the field outside the Transvaal and Orange River Colony, and all prisoners of war outside South Africa, on declaring their acceptance of the position of subjects of Edward VII., should be brought back to their homes; the possession of rifles to be allowed to persons requiring them for protection, on taking out a license; military administration to be succeeded as soon as possible by civil administration, and ultimately by representative institutions and self-government; £3,000,000 to be granted for assisting in the restoration of the people to their homes, besides advances on loan free of interest for two years.

In this great struggle there had been engaged on the British side at one time or another, or sent to the seat of war as reinforcements, a grand total of 448,435 men of all arms. In this figure were included 228,171 regulars, 45,566 militia, 35,520 yeomanry, 19,856 volunteers, 7273 South African constabulary, 18,229 regular troops from India, 29,000 Colonial contingents, 52,414 raised in South Africa. Of these 518 officers and 5255 men were killed, 1851 officers and 20,978 men were wounded, 554 officers and 15,617 men died of wounds or disease. How many men the Boers had in the field from first to last, including the rebels belonging to Cape Colony and Natal, will probably never be known. The writer of *The Times History of the War* estimates the number at 60,000 to 65,000. The bulk of these could always take part in fighting, only a relatively small portion of the British forces could at any time do so.

South Bethlehem. See *Bethlehem (Pa.)*.

Southbridge, a town of the United States, in Massachusetts, 18 miles south-west of

Worcester, with manufactures of cottons, woollens, &c. Pop. 10,025.

South Dakota. See *Dakota*.

Southwold, mun. bor. and watering-place of England, in Suffolk, near the mouth of the Blyth, 11 miles south by west of Lowestoft. It is situated on rising ground and has various attractions, including fine promenades along the cliffs. Two naval battles with the Dutch are named from Southwold (or Sole) Bay. The first took place in 1665, the second in 1672, and in both the English, under the Duke of York (James II.), were victorious. Pop. 2800.

Span, the distance from the tip of the thumb to the tip of the little finger of the outstretched hand, a length of about nine inches, or half a cubit. See also *Arch*.

Sparring. See *Smelt*.

Spartanburg, a town of the United States, in South Carolina, 85 miles north-west of Columbia, with a Methodist Episcopal College. Pop. 11,395.

Spathic Iron Ore. See *Iron*.

Spectroheliograph, an instrument invented by Hale, an American, in 1889 for photographing the sun by monochromatic light. It is a modified spectroscope, and is of great value in solar investigation.

Specular Iron Ore. See *Iron*.

Speier. See *Spices*.

Spelling. See *Glossic, Visible Speech, Phonography, Shorthand, Writing*.

Spence's Metal, formed by melting together iron sulphide and sulphur, is not strictly a metal at all, but a sort of hard cement. It can be made to look like bronze, and has been used for making busts and similar objects.

Spennymoor, an urban dist. of England, Durham, 6 miles south of Durham, with collieries and ironworks. Pop. 16,665.

Sphaerosiderite, a concretionary form of natural carbonate of iron.

Sphere of Influence, a territory adjacent to a colonial possession or protectorate of any power within which that power claims to exercise a certain amount of authority, mostly indirect and occasional, and from which it excludes the authority of all other powers. A sphere of influence is thus a region in preparation for the status of a protectorate. The name has been much used in the politics of expansion since about 1884, when the scramble for territory in Africa and elsewhere began.

Spherical Triangle. See *Triangle, Trigonometry*.

Spielberg. See *Brünn*.

Spilsby, a market-town of England, Lincolnshire, 19 miles north-east of Boston, with an ancient parish church and an old grammar-school; the birthplace of Sir John Franklin. Pop. (par.), 1424.

Spinthariscopes, an instrument invented in 1903 by Sir William Crookes for exhibiting certain brilliant scintillations due to radium. It consists of a brass tube with a lens at one end, and at the other a screen of zinc sulphide with a small bit of radium in front of it.

Spirifer, an extinct genus of hinged Brachiopoda, abundant in Palaeozoic times. See *Geology*.

Spirillum, a name for certain minute organisms of the class bacteria, which, like others called *spirochetes*, are present in and the cause of *spirillar fever*. See *Bacteria, Germ Theory*.

Spirit, HOLY. See *Holy Ghost, Trinity*.

Splenic Fever. See *Anthrax*.

Sporophyte, that stage in the life-history of a cryptogamous plant which produces the spores; especially in ferns, the most conspicuous form of the plant, consisting of the frond with its sori.

Sporozoa, a class of Protozoa, substantially identical with Gregarinidae (which see).

Sport. See *Athletic Sports, Games, Horse-racing, &c.*

Sprue, a name for the disease thrush or aphthæ (which see).

Squaring the Circle. See *Circle*.

Squire. See *Chivalry*.

Ssuma'o, SUMAO, or SZEMAO, a town of China, province of Yunnan, 100 miles east of the Mekong river. It was opened to foreign trade in 1897. Pop. 10,000.

Staaten Island. See *Staten Island*.

Stagira. See *Aristotle*.

Standardization, the introduction of uniform or standard patterns, sizes, or materials by common agreement in the construction of machinery, &c. In the constructional details of machines all sorts of meaningless variations occur when makers have no common understanding. These cause great difficulty in the replacement of parts, and tend to check the development of the engineering industries. The introduction of uniform standards in no way restricts the development of new designs and types, while the saving in cost and trouble to all concerned is incalculable. The question has become very important in recent years, and

STANDISH — STEAMSHIP LINES.

considerable progress in standardization has been made. A British Engineering Standards Committee was constituted in 1902. It consists of representatives of the Institutions of Civil, Mechanical, and Electrical Engineers, the Institution of Naval Architects, and the Iron and Steel Institute. Its funds are provided by these institutions, the railway companies, the chief engineering firms, and by a grant from the Government. A standard specification for steel used in ships' hulls, a specification for boiler steel, standard specifications for locomotive parts, standard rail-sections, &c., have come under its purview.

Standish, an urban dist. of England, in Lancashire, 3 miles N.N.W. Wigan, with coal-mines. Pop. 6303.

Stanley. See *Derby (Earl of)*.

Stanley, an urban dist. of England, in Yorkshire (W. Riding), 2 miles N.N.E. Wakefield, with collieries, brickworks, rope-works, &c. Pop. 12,290.

Stanley, an urban dist. of England, in Durham, 7 miles W.S.W. Durham, with collieries. Pop. 13,554.

Stanley Pool, a lake-like expansion of the river Congo, in latitude 4° S., about 25 miles long by 16 miles broad. See *Congo Free State*.

Stannic Acid, H_2SnO_3 , hydrated stannic oxide (see *Tin*), forming salts called *stannates*. Sodium stannate is a valuable mordant in dyeing and calico-printing.

Stannotype, in photography, a process for multiplying copies of a photograph, a modification of the original Woodbury process or Woodburytype, in which a sheet of tin-foil covers the surface of the mould, and forms the surface that receives the ink from the roller in printing. See *Photography*.

Star Jelly, one of the popular names of *Nostoc* (which see).

State Papers. See *Records*.

Stationers' Hall, the hall of the Stationers' Company in London. The company was incorporated in 1557 and enjoyed a privileged position in connection with printing and publishing till 1842, when the Copyright Act was passed. Till that date, every publication had to be 'entered at Stationers' Hall', but now registration at Stationers' Hall is necessary only for the purpose of maintaining copyright against infringement.

Statute of Frauds. See *Fraud*.

Staurolite. See *Cross-stone*.

Stavesacre, a species of larkspur (*Del-*

phinium staphisagria), found in the Mediterranean lands, from whose poisonous seeds is obtained an ointment useful against lice.

Steam-carriage. See *Motor Vehicles*, *Steam-engine*.

Steam-digger, an agricultural machine, driven by steam, which digs up soil by means of broad forks in a way similar to hand-digging. It is said to be superior to any kind of plough in efficiency and economy.

Steamship Lines. The City of Dublin Steam Packet Company, a pioneer in steamship lines, was established in 1823 and is still in existence. The General Steam Navigation Company was founded in the following year and is also still in existence. There are at present about forty steamship lines of all nations with a total tonnage of not less than 100,000 each, about half of them being British. Some of the more important British steamship lines or companies are the following:—Cunard Steamship Company, founded in 1840, from Liverpool to New York and Boston, famous for its fine fleet (*Campania*, *Lucania*, *Carmania*, *Lusitania*, and *Mauritania*); British India Steam Navigation Company, founded in 1855, serving the British and Dutch East Indies, the Persian Gulf, Queensland, the Philippines, Japan, &c.; Peninsular and Oriental Steam Navigation Company, founded in 1835, running to India, Ceylon, Straits Settlements, China, Japan, and Australia; White Star Line, founded in 1869, principally to New York and Boston from Liverpool, noted for many fine vessels (*Oceanic*, *Teutonic*, *Majestic*, *Celtic*, *Cedric*, *Baltic*); Ellerman Lines, comprising the Ellerman Line, City Line, Hall Line, &c., running to India, the Mediterranean and Black Sea, &c.; Union-Castle Line, formed in 1900 by the amalgamation of the Union Line (1853) and the Castle Line (1872), to South Africa from Southampton and London; Elder, Dempster, & Co., owning the British and African Steam Navigation Company, the African Steamship Company, and other lines, serving West Africa, the West Indies, &c.; Holt Line, to China, Japan, Vancouver, Straits Settlements, Dutch East Indies, and Australia; Leyland Line, to American cotton ports, West Indies, &c.; Harrison Line, to West Indies, United States, Central and South America, East Indies, East Africa, &c.; Wilson Line, to Baltic ports, Black Sea, America, and India, with Hull as its head-quarters; Pacific Steam Navigation Company, incorporated

in 1840, to the west coast of South America from Liverpool; Clan Line, founded in 1878, from Glasgow and Liverpool to India, South Africa, &c.; Allan Line, dating as a sailing-ship line back to 1820, and now including the State Line, sailing chiefly between Glasgow and Canada; Anchor Line, founded in 1852, from Glasgow to United States and India; Royal Mail Steam Packet Company, incorporated in 1839, to the West Indies and South America. Among British Colonial lines the largest is the Union Steamship Company of New Zealand (1875), with services between Australia, New Zealand, and Canada. The chief foreign steamship lines are as follows:—Hamburg-America Line, dating from 1847, now the largest in the world, maintaining services from Hamburg to the United States, Canada, West Indies, Central America, South America, eastern Asia, &c.; North German Lloyd (1856), with head-quarters at Bremen, sailing to America, eastern Asia, Australia, &c., the second largest line in the world; Messageries Maritimes de France (1851), from Marseilles and Bordeaux to Mediterranean and Black Sea ports, India, Australia, New Zealand, China, Japan, Dutch East Indies, eastern Africa, South America, &c. The American Line, including the Inman and Red Star Lines, with Philadelphia as its head-quarters, maintains a transatlantic service. The International Mercantile Marine Company, a combine effected by J. Pierpont Morgan in 1902, comprises the American, Atlantic Transport, Dominion, Leyland, Red Star, and White Star Lines.

Steam-turbine. See *Turbines (Steam)* in *Supp.*

Steatornis. See *Guacharo*.

Steelton, a town of the U. States, in Pennsylvania, on the Susquehanna, with iron and steel works. Pop. 12,086.

Stella. See *Swift (Jonathan)* and *Sidney (Sir Philip)*.

Stellenbosch (stel'en-byush), a town of Cape Colony, 25 miles N.E. Cape Town, with a college, a Dutch theological seminary, &c. It is, after Cape Town, the oldest European settlement in South Africa, and produces wine and fruit. Pop. 7573.

Stellerine, a name of the animal described at Rhytina (which see).

Stendhal. See *Beyle*.

Stephanotis, a genus of plants of the order Asclepiadaceæ. *S. floribunda*, sometimes called *wax-flower*, is a favourite in

cultivation. It is a climbing plant, with bunches of fragrant, white, waxy flowers, a native of Madagascar.

Stepney, a metropolitan borough in the county of London, embracing several of the docks, the Tower, the Mint, &c. Pop. 298,600, a large proportion being Jews. One of the single-member divisions of the Tower Hamlets parl. bor. is called Stepney; pop. 63,698. See *London*.

Stern, DANIEL. See *Agoult*.

Stevenage, an urban dist. of England, in Hertfordshire, 4 miles south-east of Hitchin, with an ancient grammar-school and a straw-plait industry. Pop. 3957.

Stevens, ALFRED, Belgian painter, born in Brussels in 1828, died in Paris in 1906. He received his art training at Brussels under Navez and at Paris under Ingres, and soon attained great success. Among his chief pictures are: *The Love of Gold*, *A Masquerade on Ash Wednesday*, *Consolation*, *At Home*, *The Lady in Pink*, *The Four Seasons* (in the palace at Brussels), *Ophelia*, *The Parisian Sphinx*, *The Japanese Mask*, and *The Lady Bird*.

Stillwater, a town of the U. States, in Minnesota, on the St. Croix river, 15 miles north-east of St. Paul. Pop. 12,318.

Sting-fish. See *Weever*.

Stinkstone, a variety of limestone which gives off a fetid odour when quarried. The odour is that of escaping sulphuretted hydrogen, and may be strong enough to overpower the workmen quarrying the stone.

Stink-trap, a contrivance for preventing the escape of effluvia from the openings of drains.

Stinkwood, the timber of a species of laurel (*Ocotea* or *Oreodaphne bullata*) found in Cape Colony and Natal, supplying excellent timber extensively used in wagon-building and also in furniture-making.

Stipa. See *Feather-grass*.

Stirling-Maxwell. See *Maxwell*.

Stitchwort, a popular name of several species of plants of the genus *Stellaria*. See *Starwort*.

Stocks. See *Stock-exchange*, *Stockjobbing*.

Stocksbridge, an urban dist. of England, in Yorkshire (West Riding), 8 miles north-west of Sheffield, with a manufacture of steel wire. Pop. 6566.

Stoke Poges, a village of England, in Buckinghamshire, 2 miles north of Slough. The churchyard is celebrated as the scene of Gray's *Elegy*, and Gray is himself buried here. Pop. (par.), 1398.

Stokes, WHITLEY, Celtic scholar, born at Dublin in 1830, was educated at Trinity College there, and was called to the bar at the Inner Temple in 1855. He held various high legal posts in India, and drafted the greater part of the Indian codes of civil and criminal procedure. He published several legal works, especially on Indian law, but he is best known by his works in Celtic scholarship. These include *Irish Glosses* (1860); *Goidelica* (1872); *The Tripartite Life of St. Patrick* (1887), in the *Rolls Series*; *Lives of Saints from the Book of Lismore* (1889); *Urkeltischer Sprachschatz* (1894), with Prof. Bezzenberger; &c. He died in 1909. He was a C.S.I. and C.I.E., and his work was highly appreciated in France and Germany.

Stolen Goods. No property in stolen goods passes to the thief, and he cannot give any title to them to an innocent purchaser, except by sale in market overt. If the original owner of the stolen goods prosecutes the thief to conviction, the property in his goods reverts to him, even if they have been sold in market overt. Any person advertising for stolen goods on terms of not prosecuting or asking no questions is liable to a forfeiture of £50. See *Receiving Stolen Goods*.

Stove-plants, plants which are cultivated in stoves or tropical houses, in which a fairly high temperature is maintained by means of hot-water pipes.

Stratford, a city of Canada, prov. Ontario, on the river Avon, 83 miles w.s.w. Toronto, with railway workshops (Grand Trunk) and manufactures of agricultural implements, machinery, &c. Pop. 13,000.

Strathcona, a town of Canada, in Alberta, across the Saskatchewan from Edmonton.

Strathcona, DONALD ALEXANDER SMITH, BARON, Canadian statesman, was born at Forres, in Scotland, in 1820. Early entering the service of the Hudson's Bay Company, he became in 1863 its chief officer. He was a member of the Dominion House of Commons during most of the period 1871-98. He was created K.C.M.G. in 1886, G.C.M.G. in 1896, and was raised to the peerage in 1897. He is governor of the Hudson's Bay Company (as a purely commercial concern), and has been high commissioner for Canada in Britain since 1896. He raised and equipped at his own cost a force of six hundred Canadians, known as *Strathcona's Horse*, for service

in South Africa during the Boer War. He and his cousin Lord Mountstephen have given large sums for the endowment of a free hospital in Montreal in commemoration of Queen Victoria's jubilee, and in 1902 they gave a large sum to the King's Hospital Fund for London. He has received the honorary degree of LL.D. from several universities, and in 1899 he was elected Lord Rector of Aberdeen University, becoming Chancellor in 1903.

Strathpeffer, a village of Scotland, co. of Ross and Cromarty, 4 miles west of Dingwall, with much-frequented sulphurous and chalybeate springs. Pop. 354.

Stratus. See *Cloud*.

Strawberry Hill. See *Walpole (Horace)*.

Strawboard, thick paper-board made entirely or principally from straw, used in bookbinding, the making of boxes, &c.

Streatham (strēt'am), a residential district and parish in the county of London, 6 miles south of St. Paul's. The house of the Thrales, so much visited by Dr. Johnson, was in Streatham. Pop. 71,658.

Streator, a town of the U. States, in Illinois, on the Vermilion, 80 miles southwest of Chicago, with manufactures of bricks, tiles, glass, flour, &c. Pop. 14,079.

Streptococcus, a genus of bacteria including the species which is associated with erysipelas. See plate at *Germ Theory*.

Strike, in geology, the horizontal direction of the outcropping edges of tilted strata, at right angles to the *dip* (which see).

Stromness, a town of Scotland, in the Orkneys, on Pomona, 12 miles west by south of Kirkwall, with a fine bay; fishing and boatbuilding. Pop. 2450.

Struma, same as *scrofula* (which see).

Stuffing. See *Taxidermy*.

Subaltern, an officer in the army below the rank of captain.

Submarine Mines. See *Torpedo*.

Succory, a variant of chicory (which see).

Sucrose. See *Sugar*.

Suction Gas-producer, a plant for making producer-gas by drawing a mixture of steam and air through red-hot coal by the suction of the piston of a gas-engine supplied with its fuel by the producer. See *Producer*.

Sudbury, a rising town of Canada, prov. Ontario, on the Canadian Pacific Railway, 210 miles N.N.W. Toronto, with important deposits of nickel and copper in the neighbourhood. Pop. 2000.

Sudd, a dense mass of floating plants or

other vegetable matter, often forming an obstruction to navigation in the upper Nile or its tributaries. It has been more or less completely removed at various times, especially during 1900-02, but constant care is required to prevent it from accumulating again.

Sudorifics. See *Diaphoretics*.

Suffocation. See *Asphyxia*.

Sui Juris, a legal term used of one who is capable of managing his own affairs, thus excluding infants, lunatics, &c.

Sul'phonal, a substance of complicated composition, with the empirical formula $C_7H_7S_2O_4$, prepared in the form of colourless, tasteless crystals of prismatic form, which are slightly soluble in cold water. It is used in medicine to induce sleep.

Sun-bath, the exposure of the naked body to the direct rays of the sun, especially as a therapeutic measure.

Sundarbans. See *Sunderbunds*.

Sunday Closing. In Scotland the Forbes Mackenzie Act of 1853 enacts the closing of all public-houses and other licensed premises on Sunday, but *bona-fide* travellers and lodgers may be supplied at a licensed inn or hotel. In Wales Sunday closing of licensed premises has obtained since 1881, with some exceptions. In Ireland Sunday closing is also the law since 1878, except in the towns of Dublin, Belfast, Cork, Limerick, and Waterford, in which public-houses may open (under the Act of 1906) from two till five p.m. on Sunday. Public-houses in the county of London may open on Sunday from one to three, and from six to eleven p.m.; in the rest of England the hours are 12.30 to 2.30, and six to ten. The increase of Sunday trading generally has led to a movement for closing all shops on Sunday, with certain specified exceptions.

Sungei Ujong, a state of the Malay peninsula under British protection, since 1895 included in Negri Sembilan (which see in *Supp.*).

Sunium. See *Colonna*.

Sunshine-recorder, an instrument for recording the amount or duration of sunshine during any period of time. One type of recorder is the photographic, which consists of a half-cylinder lined by sensitive paper, upon which the sun's rays act through a small aperture in the rectangular side, making a very exact record of the amount of sunshine.

Superior, a town of Wisconsin, U.S., at the head of Lake Superior, opposite Duluth,

with a good harbour, a large lake trade, and manufactures of flour, lumber, iron, and woollen goods, besides shipbuilding, &c. Pop. 31,091.

Superphosphates. See *Phosphate*.

Supervision, BOARD OF. See *Poor*.

Supply. See *Demand and Supply*.

Surbiton, an urban district of England, in Surrey, on the Thames, opposite Hampton Court, practically a suburb of Kingston. Pop. 15,017.

Suspended Animation, temporary cessation of the outward signs of life. See *Asphyxia*, *Drowning*, *Trance*, *Catalepsy*, *Coma*, &c.

Sutton, an urban dist. of England, in Surrey, 11 miles s.s.w. St. Paul's, London. Pop. 17,223.

Sutton-on-Sea, a watering-place of England, on the coast of Lincolnshire, 12 miles e.s.e. Louth. Pop. 2710.

Suvalky. See *Souvalky*.

Sveaborg. See *Sveaborg*.

Svendborg, a seaport of Denmark, on the south coast of Funen, on the sound separating Funen from Taasinge. Pop. 11,543.

Sverdrup, OTTO, Norwegian Arctic explorer, born in 1854. He accompanied Nansen in his Greenland expedition of 1888-89, and was captain of the *Fram* in the more famous expedition of 1893-96. When Nansen left the *Fram* in order to press farther north by sledge, Sverdrup took command of the main party and brought the vessel safely home. He led another Arctic expedition in the *Fram* in 1898-1902, making valuable discoveries on the north-western coast of Greenland and about the Parry Islands. He has given an account of this voyage in his *New Land* (1903; Eng. trans., 1904).

Swadlincote, an urban dist. or town of England, in Derbyshire, half-way between Burton-on-Trent and Ashby-de-la-Zouch, a place of recent upgrowth, with collieries and manufactures of earthenware, including sanitary goods, &c. Pop. 18,014.

Swaffham, an urban dist. of England, in Norfolk, 25 miles west of Norwich, with a fine parish church. Pop. 3371.

Swan, SIR JOSEPH WILSON, English inventor, was born at Sunderland in 1828. His inventions include rapid dry plates, bromide paper, the carbon or autotype process, and other improvements in photography, the incandescent electric lamp, a miner's electric safety lamp, and improve-

ments in photo-mechanical printing and electro-metallurgy. He is a Fellow of the Royal Society and a Chevalier of the Legion of Honour, and received the honour of knighthood in 1904.

Swanage, an urban district and watering-place of England, in Dorsetshire, in the Isle of Purbeck, on Swanage Bay, 7 miles south by east of Poole. King Alfred defeated the Danes in Swanage Bay in 877. Pop. 3408.

Swearing, **PROFANE**, the familiar use of the name and attributes of God for the sake of emphasis, or otherwise. Profane swearing is punishable by fine under the Profane Oaths Act of 1745, and several acts passed in the reign of Queen Victoria attach penalties to the use of profane and obscene language in public places.

Sweet, **HENRY**, English philologist and phonetician, born in London in 1845, was educated at King's College, London, Heidelberg University, and Balliol College, Oxford. He was appointed university reader in phonetics at Oxford in 1901. His publications include *Old and Middle English Primers and Readers*, editions of *Old and Middle English texts*, a *Student's Diction-*

ary of Anglo-Saxon, a *Primer of Spoken English*, a *New English Grammar*, a *Historical English Grammar*, a *Primer of Phonetics*, a *History of English Sounds*, a *History of Language*, *The Practical Study of Languages*, *Shelley's Nature-Poetry*, &c. He is a strong advocate of spelling reform.

Swietenia. See *Mahogany*.

Swindling. See *Fraud*.

Swinton. See *Pendlebury in Supp.*

Switchback, a form of railway on which a car ascends a steep slope by movements alternately backward and forward across the slope. The name is now more commonly applied to a railway on which a car ascends slopes by means of the momentum acquired by previous descents. The latter kind of switchback provides a well-known form of amusement at fairs, exhibitions, &c.

Swoon. See *Painting*.

Sylviculture. See *Forestry*.

Syn'tonin, an albuminoid produced by the action of dilute hydrochloric acid on myosin, the albuminoid of the muscles; said to play an important part in the digestive process.

Syrus, **EPHRAEM**. See *Ephraem Syrus*.

Szenta. See *Zenta in Supp.*

T.

Taal, a degenerate form of Dutch spoken by the Boers in South Africa.

Tadcaster, a market-town of England, West Riding of Yorkshire, on the Wharfe, 9 miles south-west of York, with breweries, stone quarries, &c. Near it is the battlefield of Towton. Pop. 3043.

Taku, a fortified town of China, near the mouth of the Pei-ho, 100 miles south-east of Peking, with which it is connected by rail. Its forts were taken by European forces in 1858, 1860, and 1900.

Talegalla. See *Tallegalla*.

Talienwan, a bay on the east side of the Liao-tung Peninsula, in Manchuria, with the port of Dalny on its shores. It was included in the Port Arthur territory leased to Russia in 1898, and conquered by Japan during the war of 1904-05.

Tammerfors, a town of Finland, 100 miles N.N.W. Helsinki, between two lakes which are joined by a stream with rapids. It manufactures cottons, woollens, linens, leather, paper, &c. Pop. 39,331.

Tanfield, an urban district of England,

in Durham, 10 miles north-west of the city of Durham, with collieries, iron mines, quarries, &c. Pop. 8276.

Tariff Reform, a phrase distinctively associated in recent British politics with the name of Mr. Joseph Chamberlain, whose main proposals, as put forward in 1903, are to impose duties on all corn, flour, meat, dairy produce, and manufactured goods imported into Britain from foreign countries (maize and bacon, however, being excepted), leaving imports from the colonies untaxed as at present; and, by way of compensation to British consumers for any consequent increase in prices, to remit part of the duties on tea, sugar, coffee, and cocoa. There would be no duty on raw materials, and a preference would be given to colonial wines and fruits. These proposals, as is well known, led to a vigorous and prolonged controversy and much opposition throughout the country, and had an important influence on the result of the general election of 1906. The fiscal question cannot be satisfactorily treated so long as it is made

practically a party question and not considered as one that is purely economic and national.

Tarik. See *Gibraltar*.

Tasman Sea, the sea between New Zealand and Australia.

Tate Gallery, officially NATIONAL GALLERY OF BRITISH ART, a public collection of pictures in London, occupying a building in Westminster, on the site of the former Millbank Penitentiary, close to the Thames. The nucleus of the gallery was a collection of sixty-five pictures by British artists presented to the nation by Sir Henry Tate (1819-99), a wealthy sugar-refiner, who also defrayed the cost of the building. The gallery was opened in 1897.

Tavern. See *Inn*.

Taxameter, or TAXIMETER, an instrument of the pedometer type for registering the distance travelled by a cab or similar vehicle, and so determining the fare payable by the passenger. It is operated by the rotation of the axle of the wheels, and can be graduated so as to indicate the desired information at a glance, without requiring any calculation. Taxameters have been for some time in use in Paris, Berlin, and other continental towns, and are now in use in this country.

Tayport, formerly FERRYPORT-ON-CRAIG, a police burgh of Scotland, in Fifeshire, at the entrance of the Firth of Tay, opposite Broughty Ferry, with a ferry in connection with the N. British Railway. Pop. 3325.

Tchelyuskin. See *Chelyuskin* in *Supp.*

Tcherkessia. See *Circassia*.

Teb, El, a place in the Egyptian Sudan, near the Red Sea coast, 45 miles s.s.e. of Suakin, the scene of a battle fought on Feb. 29, 1884, in which Osman Digna was defeated by General Graham.

Teething, the acquiring of the milk teeth by children, generally accompanied by some disturbance of the general health. The earliest teeth are cut usually about the seventh month, and the first set is complete, on the average, at the age of two. There are cases on record of children being born with some teeth already cut; on the other hand, there are cases of children who cut no teeth till some years after birth. As a rule, late teething is an indication of backward development. The teeth are already in their sockets in the jaw when the child is born, and their continued growth causes them to press against the gum till they cut their way through. While the

milk teeth are pushing their way out, the foundations of the permanent set are already being laid. The first of the permanent set appears above the gum about the age of six. During teething children are more than usually irritable, and are specially liable to ailments of various kinds, but many infantile troubles are wrongly ascribed to teething. Careful attention to the general health and special care of the bowels are necessary.

Tehama. See *Arabia*.

Telegraphone, a form of telephone apparatus recently invented by Valdemar Poulsen, a Dane, which receives the fluctuations of current produced by sound-waves on the transmitter, and transforms them into magnetic fluctuations, which are stored up for any length of time, and can be converted back again into sound-waves at will. Its essential part consists of two drums of fine steel wire and a small electro-magnet. While the wire is unwinding from one drum and winding on to the other, it passes close to the poles of the electro-magnet, and the variations of current in the electro-magnet are recorded on the wire as a series of magnetic fluctuations due to varying magnetization. This magnetic writing, as it has been called, can be reproduced in the form of sound by winding back the wire to its initial position and then unwinding it as before past the same electro-magnet, now connected to an ordinary telephone receiver. Another form of the instrument gives disc records, which can be reproduced on a similar instrument.

Telegraph Plant, same as *Moving Plant*.

Tel-el-Amarna. See *Tell-el-Amarna* below.

Tel-el-Kebir. See *Tell-el-Kebir*.

Telepathy, a word introduced by the Society for Psychical Research to denote the communication which it is believed may take place between minds at a distance without the agency of the ordinary sense organs. Telepathy is one of a large group of obscure psychic phenomena which have been under investigation in recent years.

Tell-el-Amarna, a ruined town of Egypt, near the Nile, 55 miles by river below Assiut made the capital by Amenophis IV., of the eighteenth dynasty. Valuable cuneiform tablets have been found here, giving reports of affairs in Western Asia.

Temperament, that individual peculiarity of physical organization by which the prevailing manner of acting, feeling, and

thinking of each person is permanently affected. The ancients distinguished four temperaments, named from the supposed excess of one or other of the principal humours or fluids of the body: the *choleric* or *bilious*, the *phlegmatic*, the *melancholic*, and the *sanguine*. Modern authorities have employed the terms *sanguineous*, *nervous*, *nervo-sanguineous*, *sanguineo-nervous*, *lymphatic*, and *phlegmatic*.

Temple, **FREDERICK**, Archbishop of Canterbury, born in the Ionian Islands in 1821, was educated at Tiverton and Balliol College, Oxford, and, after graduating, became a fellow of his college. He took orders in 1846, was appointed principal of Kneller Hall Training College in 1848, and in 1858 became head-master of Rugby School. He was one of the contributors to the famous *Essays and Reviews* (1860), his subject being *The Education of the World*. He was appointed bishop of Exeter in 1869 in spite of great opposition. In 1885 he was transferred to the see of London, and in 1896 he succeeded E. W. Benson as Archbishop of Canterbury, in which capacity he crowned Edward VII. in 1902. His death occurred in the same year. He was an able administrator.

Tenos. See *Tinos*.

Terneuzen, a fortified seaport of Holland, on the Scheldt estuary, at the entrance of a canal leading to Ghent (which see). Pop. 8174.

Terry, **ELLEN ALICE**, English actress, born in 1848, made her first appearance on the stage in 1856 at the Princess's Theatre, under the management of Mr. Charles Kean. She is best known from her connection with Irving. On Dec. 30, 1878, she made her first appearance with him at the Lyceum Theatre, whose management he had recently taken over. Her rôle on that occasion was Ophelia, always one of her finest parts; and among others sustained by her during her long association with the Lyceum and Sir Henry Irving are *Pauline* (*The Lady of Lyons*), *Portia*, *Juliet*, *Beatrice*, *Viola*, *Lady Macbeth*, title-rôle in *Reade's Nance* *Oldfield*, *Queen Katherine* in *Henry VIII.*, *Cordelia*, *Rosamund* (*Tennyson's Becket*), *Guinevere* (*Carr's King Arthur*), *Imogen*. The jubilee of her first appearance on the stage was celebrated by a unique series of performances in London in 1906. In 1868 she married Mr. Wardell, an actor, professionally known as *Kelly*, who died in 1885.

Tettenhall, an urban district of England, in Staffordshire, 2 miles north-west of Wolverhampton. Pop. 5337.

Tetter, a popular name of various skin diseases, such as eczema (moist tetter), psoriasis (dry tetter), dandruff, and impetigo (pustular tetter).

Thann (tân), a town of Germany, in Alsace-Lorraine, on the Thur, 60 miles south-west of Strasburg, with a fine old Gothic minster. Pop. 7618.

Tharsis (târ'sis), a town of Spain, in the province of Seville, 25 miles N.N.W. Huelva, with rich mines of copper, which were worked in ancient times. Pop. 4000.

Thayetmyo, a town of Burma, capital of a district of the same name, on the Irrawaddy, about half-way between Rangoon and Mandalay. Pop. 13,215.

Thebaine, $C_{19}H_{21}NO_8$, a very poisonous alkaloid present in small quantities in opium, from which it can be prepared in the form of prismatic crystals.

Theodosia. See *Feodosia*.

Thesiger. See *Chelmsford* (Lord).

Third, in music. See *Interval*.

Thirty-nine Articles. See *Articles* (*The Thirty-nine*).

Thomas, **ARTHUR GORING**, English composer, born in 1850, received his musical education under Durand in Paris and in the Royal Academy under Sullivan and Prout, and at a later period studied orchestration under Max Bruch. His opera, *The Light of the Harem*, belongs to his student days. *Esmeralda* (1883) followed with great success, and his later operas are *Nadeshda* (1885), and *The Golden Web* (1893), the latter completed by another hand. His other works include *The Sun-Worshippers* (1881; a choral ode), *Out of the Deep* and *The Swan* and the *Skylark* (cantatas), orchestral and violin pieces, songs, &c. He died in 1892.

Thomas-Gilchrist Process. See *Steel*.

Thompson, **ELIZABETH**. See *Butler* in *Supp.*

Thompson, **SIR HENRY**, English surgeon, born in 1820, was educated at University College, London, and gained high distinction in medicine, &c. In 1853 he became assistant-surgeon in University College Hospital, surgeon ten years later, professor of clinical surgery in 1866, and consulting surgeon in 1874. In 1884 he was appointed professor of pathology and surgery to the Royal College of Surgeons. He was knighted in 1867, and was created a baronet in 1899.

He died in London in 1904. His works treated mostly of the urinary organs and their diseases, of cremation (of which he was a strong supporter), and of diet.

Thompson, SILVANUS PHILLIPS, physicist, born at York in 1851, was for a time a science master in York, and in 1876 became professor of experimental physics in University College, Bristol. Since 1885 he has been principal and professor of physics in the City and Guilds Technical College, Finsbury, London. He has carried out valuable researches in electrical science, and has published several excellent works on it, including *Electricity and Magnetism* (1881) and *Dynamo-Electric Machinery* (1885), besides various other works.

Thomson, SIR JOSEPH JOHN, English physicist, born in 1856, educated at Owens College (now University of Manchester), and Trinity College, Cambridge. He graduated as second wrangler in 1880, and became a fellow of his college in the same year. Since 1884 he has been Cavendish professor of experimental physics in the University of Cambridge, and in this capacity he has done admirable work. His works, all of a highly technical kind, include *The Motion of Vortex Rings* (1884), *Recent Researches in Electricity and Magnetism* (1892), *Elements of the Mathematical Theory of Electricity and Magnetism* (1895), *Discharge of Electricity through Gases* (1897), *Conduction of Electricity through Gases* (1903), *Electricity and Matter* (1904), *A Text-book of Physics* (with J. H. Poynting, vol. iii., 1905), &c. He holds the Royal and the Hughes medals of the Royal Society, the Hodgkin medal of the Smithsonian Institution, obtained the Nobel prize for physics (1906), and has been knighted.

Thornhill, an urban district of England, W. Riding of Yorkshire, about 2 miles south of Dewsbury. Pop. 10,290.

Thornycroft, WILLIAM HAMO, sculptor, was born in London in 1850, being the son of Thomas and Mary Thornycroft, both sculptors, and brother of Sir John Thornycroft, the naval architect. He worked in his father's studio for two years, and in 1869 entered the Royal Academy schools. He first exhibited at the Academy in 1871, and in the same year he went to Italy. In 1875 he gained a gold medal from the Academy for a group representing *A Warrior bearing a Wounded Youth from the Field of Battle*. He became A.R.A. in

1881 and R.A. in 1888. He was made an honorary member of the Royal Academy of Munich in 1889, and received a medal at the Paris exhibition of 1900. His works include: *Teucer* (1881), purchased for the nation from the Chantrey fund and now in the Tate Gallery; *The Mower* (1884); *The Sower* (1886); the National Memorial to General Gordon in Trafalgar Square, London; *Medea* (1888); *The Mirror* (1890), his diploma work; *The Joy of Life* (1896); *Lot's Wife*; and statues of the following: Lord Granville (Houses of Parliament), Queen Victoria (Royal Exchange, London), Archbishop Thomson (York Minster), Oliver Cromwell (Houses of Parliament), Dean Colet, and W. E. Gladstone (Glasgow, 1902).

Thought-reading, or **MIND-READING**, the alleged power possessed by some persons of discovering what another person may be thinking of, without any assistance from look, word, gesture, or other such indication. It is generally exercised by muscular contact with the person whose thoughts are read, and is explained as really muscle-reading.

Thread-cells. See *Calenterata*.

Threshing. See *Thrashing-machine*.

Throat, AFFECTIONS OF THE. See *Sore-throat in Supp.*, *Catarrh*, *Quinsy*, *Diphtheria*, *Croup*, *Laryngitis*, &c.

Thumb, TOM. See *Dwarf*.

Thymol, $C_{10}H_{14}O$, a phenol prepared from oil of thyme in the form of colourless thyme-smelling crystals, soluble in alcohol and glycerine, but very slightly in water. It is a powerful antiseptic, and is used in medicine.

Thyroid Cartilage. See *Larynx*.

Tian-shan. See *Thian-shan*.

Tibur. See *Tivoli*.

Tietjens. See *Titiens (Teresa)* below.

Tiffin, a town of the U. States, in Ohio, on the Sandusky river, the seat of a university. Pop. 10,989.

Tight-lacing. See *Corsets*.

Til. See *Teel*.

Tim'aru, a town of New Zealand, on the east coast of South Island, about half-way between Christchurch and Dunedin, an important seaport. Pop. 6421.

Time, STANDARD. Local time, as determined by the sun, varies uniformly with longitude, one degree of longitude corresponding to four minutes of time, fifteen degrees to an hour. Of any two given places the time of the more easterly is in advance

of the time of the other. In these days of rapid intercommunication and close international relations it is found necessary to secure as much uniformity as possible in the determination of time, and accordingly the chief countries have adopted the hour-zone system of standard time, the surface of the earth being regarded as divided into longitude-zones of fifteen degrees. The standard time for every place within one of these zones is declared to be the local time of places on its central meridian, and the difference of standard time between any two places in different zones is just as many hours as they are zones apart. Greenwich time is the standard in the United Kingdom, Belgium, and Holland, but France, which belongs to the same zone, keeps Paris time, 10 minutes earlier, and Spain uses Greenwich time only for railway purposes. Mid-European time, one hour earlier, is the legal standard for all purposes in Germany, the Scandinavian countries, and Hungary. It is also in use in Austria and on the Italian railways. European Russia takes its time from St. Petersburg, 2 hrs. 1 min. earlier than Greenwich time. The United States and British North America have five zones, respectively 4, 5, 6, 7, and 8 hours later than Greenwich. The Indian railways reckon by standard time five and six hours earlier than Greenwich time. The standard time in South (or Central) Australia is nine hours earlier, West Australian time is one hour later than this, and East Australian time one hour earlier.

Tine'idæ, a family of insects, typically represented by the clothes-moth.

Ting-hæ. See *Chusan Islands*.

Tinned Meat. See *Preserved Provisions*.

Titians, or **TITJENS** (tēt'yenz), **TERESA**, singer, was born at Hamburg of Hungarian parents in 1831, and made her début on the operatic stage in 1849 as Lucrezia in Donizetti's *Lucrezia Borgia*. She gained instant success on the Continent, and was splendidly received at her first appearance in London, in 1858, the like applause attending the rest of her career. She was no less successful in oratorio. She died in 1877.

Toadstool, a popular name for any large cap fungus supposed to be poisonous. Edible species are known as *mushrooms*.

Tobermory, a seaport of Scotland, in the island of Mull (Argyllshire), on a well-sheltered bay at the western end of the Sound of Mull. One of the ships of the

Spanish Armada was blown up in the bay in 1588, and attempts have recently been made, with but scant success, to recover treasure from it. Pop. 1175.

Tobogganing, a form of sport long practised in Canada and Russia, but now most completely developed in Switzerland. It consists in descending a snow or ice slope on a kind of sled called a toboggan, a corruption of an American Indian word. The Canadian toboggan is of wood turned up in front, and is usually without runners, and the *chute* or course is straight and of comparatively uniform slope. The toboggan used on the Cresta run at St. Moritz in Switzerland is constructed entirely of steel and provided with long, springy runners. The tobogganer lies on it at full length and controls its movement down the curved and crooked course by motions of his head and body, or by pressing on the ice with the iron-shod toes of his boots. The Cresta course is fully three-quarters of a mile long, with a drop of 500 feet, and it has been covered in 63½ seconds. Road tobogganning is also practised.

Togo, **HEIHACHIRO**, Japanese admiral, was born in 1847. After a short naval experience in his native country he spent the seven years 1871-78 in training on board a British man-of-war and at the Royal Naval College, Greenwich. He distinguished himself during the Chino-Japanese war, becoming rear-admiral at its close. On the outbreak of the war with Russia in 1904 he was appointed to the supreme naval command. He sealed Port Arthur at the very outset, maintained a close blockade, and ultimately effected the annihilation of the imprisoned fleet, but his crowning success was his victory over the Russian Baltic Fleet in the Sea of Japan in May, 1905. See *Japan*.

Toluol, **TOLUENE**, C_7H_8 , a hydrocarbon very similar to benzene, obtained by the distillation of coal-tar or tolu-balsam and also in other ways. It has been used as a thermometric liquid.

Tomi. See *Danube*.

Tom-tit. See *Titmouse*.

Tonawanda, a town of the U. States, New York, on the Niagara, between Buffalo and the Niagara Falls. Pop. 7421.

Tonbridge, the official name of Tunbridge (which see); also the name of the s.w. parl. div. of Kent. Pop. 80,250.

Tongaland, or **AMATONGALAND**, a territory on the east coast of South Africa,

between Zululand and Portuguese East Africa. It was annexed in 1895 to Zululand, now part of the colony of Natal.

Tongking. See *Tonquin*.

Tonkin. See *Tonquin*.

Tooth Powder. See *Dentifrice*.

Torreón, a rising town in Mexico, prov. Coahuila, about midway between the Atlantic and Pacific, near the junction of important railways. Pop. 13,845.

Tory Island, an island of Ireland, in the county of Donegal, $7\frac{1}{4}$ miles w.n.w. Horn Head; area, 785 acres. It is bleak and desolate, and fishing is the chief industry. It has a fine lighthouse and a Lloyd's signal station. Pop. over 300.

Tottenham, an urban dist. of England, in Middlesex, a suburb of London, 6 miles north of St. Paul's, giving name to a parl. div. Pop. of urban dist., 102,541; of parl. div., 186,774.

Tottington, an urban dist. of England, in Lancashire, 3 miles n.w. Bury, with cotton and soap works. Pop. 6118.

Tow, the coarse and broken part of flax or hemp separated from the finer part.

Tow Law, an urban district of England, in Durham, 10 miles w.s.w. Durham city, with collieries and ironworks. Pop. 4371.

Towyn, an urban dist. and watering-place of North Wales, in Merioneth, 14 miles s.w. Dolgelly, with a fine beach and important slate quarries. Pop. 3756.

Toynbee, ARNOLD, economist and social reformer, born in London in 1852, graduated at Oxford in 1878, and was at once appointed a tutor in economics at Balliol College. He spent his short, strenuous life in supporting movements such as trade unionism and co-operation, and in prosecuting valuable researches into economic history. His principal lectures are collected in the work entitled *The Industrial Revolution* (1884). His death occurred in 1883. Toynbee Hall, in Whitechapel, the first of the university settlements, was named from him.

Trade Protection Societies, societies formed to safeguard the interests of those engaged in trade. The earliest society of the kind was the London Association of Guardians for the Protection of Trade, which was founded in 1776. The present Association of Trade Protection Societies of the United Kingdom was established in 1848, and now has over a hundred affiliated local societies, with a total membership of more than 50,000.

Traders' Defence As-

sociations, organized to oppose the progress of co-operation and municipal trading, are of comparatively recent origin.

Tragopogon. See *Goat's-beard*.

Train-ferry, a ferry keeping up unbroken railway communication across a river, lake, or arm of the sea, the trains being taken bodily on board a suitable vessel and thus carried from one line of rails to another on the opposite side. Train-ferries have reached their greatest development in N. America, where some of them ply over distances of many miles on routes crossing the lakes. A train-ferry at the Straits of Dover or elsewhere is advocated by many instead of the proposed Channel Tunnel.

Tranent, a town of Scotland, in Haddingtonshire, 9 miles east of Edinburgh, with collieries in the vicinity. Pop. 2584.

Transformer, a machine for producing from an electric current another of a different kind. A transformer may be used to raise the potential or voltage of an electrical supply (*step-up transformer*) or to lower it (*step-down transformer*); to change an alternating current into a direct current or vice versa; or to produce poly-phase alternating currents from single-phase ones or vice versa. Transformers are of two main types: *static transformers*, in which no part rotates, and *rotary transformers* or *converters*, in which there is a rotating part. The rotary converter is substantially a direct-current dynamo with a closed winding. The common alternating-current transformer consists of two insulated electric circuits wound on a common iron core. The coil carrying the current to be transformed is called the primary, and the other the secondary. In the shell type the magnetic circuit encloses the windings; in the core type the windings enclose the magnetic circuit. Transformers form an essential part of the equipment of electric power and lighting stations.

Transmission of Power, the transference of energy from the place where it is produced to the places where it is to be applied. For short distances shafting, belting, pulleys, and wire-ropes may be used; beyond about a mile electricity holds the field. Electrical energy is now being regularly transmitted to distances of over 200 miles. The power may be generated at the mouth of a coal-pit, where fuel is abundant and cheap, and transmitted to localities to which it would be very costly to carry the

fuel. Or the source of power may be a river or a lake, the electric generators being driven by turbines. Formerly the current was generated at a moderate voltage, say 1000 or 2000 volts, and was passed through step-up transformers (see preceding article) before being transmitted through the high-pressure mains, but it is now usual to produce at high pressures, up to 20,000 volts, thus obviating the need for step-up transformers in most cases. The voltage of the current in the mains often reaches 40,000, however, and even 100,000 volts has been reached. Step-down transformers are required at the distributing end of the system. The mains are of copper or aluminium, properly insulated, and are placed either underground, as in Britain, or overhead on high poles with lightning arresters, as usual abroad. The ordinary method of transmitting power in factories by means of shafting, pulleys, and belts is very wasteful. Hydraulic power competes with electrical power with some success for certain purposes. Compressed air is also used, chiefly in America.

Transport. See *Commissariat*, *Army Service Corps*.

Transporter Bridge. See *Bridge*.

Traveller's Joy. See *Clematis*.

Travemünde. See *Lübeck*.

Tree-nettle. See *Nettle-tree*.

Tremadoc Slates. See *Geology*.

Treves, SIR FREDERICK, surgeon, born in Dorchester in 1853, and educated at the Merchant Taylors' School, was Hunterian professor of anatomy and Wilson professor of pathology to the Royal College of Surgeons during 1881-86, and examiner in surgery to the University of Cambridge during the period 1891-96. He was appointed consulting surgeon to the forces in South Africa in 1900, and in the same year became surgeon-extraordinary to Queen Victoria. Since 1901 he has been serjeant-surgeon to King Edward, and in 1902 he performed an operation upon him for appendicitis. He was created K.C.V.O. in 1901, received a baronetcy in 1902, and became G.C.V.O. in 1905. His publications include several works on surgery, a German-English Dictionary of Medical Terms, *Tale of a Field Hospital* (1900), and *The Other Side of the Lantern* (1905), the last a book of impressions of travel.

Trier. See *Trèves*.

Trim, a town of Ireland, county town of Meath, on the Boyne, 30 miles north-west

of Dublin, once a place of considerable strength. Pop. 1513.

Trimethylamine, C_3H_9N , a volatile liquid with a fishy odour, present in herring-brine and some species of flowers, usually manufactured from the vinasse of the beet-root sugar industry. It has been used as a cure for acute rheumatism.

Trinacria. See *Sicily*.

Tristram, HENRY BAKER, clergyman and naturalist, born in Northumberland in 1822, was educated at Durham school and Lincoln College, Oxford. Having taken orders, he acted as naval and military chaplain in the Bermudas during 1847-49, and from 1849 till 1860 he was rector of Castle Eden, in Durham. He was master of Greatham Hospital from 1860 till 1874, and was a canon of Durham from 1873 till his death in 1906. He travelled in the Sahara, Egypt, Palestine, Asia Minor, Mesopotamia, and Armenia, and became an authority on the natural history of those regions. His publications include *The Great Sahara* (1860), *Natural History of the Bible* (1867), *Bible Places* (1872), *Land of Moab* (1874), *Fauna and Flora of Palestine* (1884).

Troitsk, a town of Russia, in the government of Orenburg, on the river Uï, 230 miles east of Ufa. Pop. 24,000.

Trotting, a form of horse-racing very popular in the United States, and also practised in Britain and other European countries. Trotting races are carried out on carefully-prepared tracks a mile or half-a-mile round. The horse carries no one on its back, but is controlled by a man sitting immediately behind on a very light skeleton vehicle on bicycle wheels, called a sulky. The Americans have paid as much attention to the breeding of trotters as the English have to racers. All American trotters trace their descent to an English thoroughbred horse called Messenger, who was sent across the Atlantic in 1788. A mile has been trotted in little over two minutes.

Troupial. See *Troopial*.

Truro, a town of Canada, in Nova Scotia, on Cobequid Bay, with various factories. Pop. 5993.

Trusts and Combinations, INDUSTRIAL. The simplest form of combination or 'combine' among firms or companies producing certain goods consists in an agreement to regulate prices, and a further step leads to the control of the output of the firms concerned. The agreement may extend to the selling of the products, and there may also

TRUSTS AND COMBINATIONS—TURBINES.

be a system of equalizing profits as between the businesses which are parties to the agreement. Such combinations are known as *syndicates*, *rings*, or *pools* (on the Continent, *cartels* or *kartells*). A further development is the *trust*, which differs from the syndicate in being an actual fusion of competing businesses. The pioneer body of this kind was the Standard Oil Trust, formed in the United States in 1882, an amalgamation of numerous companies under a board of trustees, who received the stock of the constituent bodies and gave trust certificates in return. The shareholders renounced all control of policy or management, which thenceforward belonged wholly to the trustees. This procedure was declared illegal in 1892, and accordingly different plans have been adopted with the same practical effect. A new company is formed to buy out the combining companies, or at least to acquire a controlling share in their stocks, and the vendors receive shares of the new company in payment of a large part of the purchase-money. Sometimes the vendors hold jointly all the shares of the combine, and in every case they own sufficient to control it effectually. Some trusts of this sort are amalgamations of all or most manufacturers in a particular branch of business, whilst others are combinations of those concerned in a series of connected industries, beginning with the extraction of a raw material and ending with the sale of a finished product. The United States Steel Corporation, formed in 1901 by the amalgamation of ten smaller trusts, has a nominal capital of over \$1,400,000,000 (£290,000,000), but like other combinations it is greatly over-capitalized. It has a controlling interest in railways, lake steamers, and docks, and it owns practically all the stocks of the constituent trusts. On behalf of trusts it is claimed, in the main with justice, that they effect many economies in production and distribution, great saving in management, advertising, travelling, &c., being made possible, output being regulated at will and adjusted to the demand, &c. On the other hand, as in the United States, their advantages may be more than neutralized by their selfish and oppressive operation. Their evils have been shown chiefly in the U. States, where their operations have been favoured by a high protective tariff. In Britain a fair number of industries are now in the hands of combines, among them

calico-printing, cement, wall-paper, thread, &c.

Trypanosoma. See *Sleeping-sickness* in *Supp.*

Trypsin, the active principle in the pancreatic juice, playing an important part in digestion. See *Digestion*.

Tsana. See *Dembca*.

Tsaritsyn, a town of Russia, gov. of Saratov, on the Volga, at its great bend 240 miles N.W. of Astrakhan, connected with the Don by a railway, which greatly facilitates trade on both rivers. Pop. 56,000.

Tschaikovsky (chi-kof'ski), **PETER ILVITCH**, Russian composer, born in 1840. He was educated in St. Petersburg and entered the public service, but his taste for music soon asserted itself, and he studied in the Conservatorium under Rubinstein. In 1866 he was appointed principal of the Moscow Conservatorium. He died of cholera at St. Petersburg in 1893. Tschaikovsky's work is of a distinctly national character, but very unequal. His best operas are *Eugen Onegin* (1879) and *Iolanthe* (1893), and his other works comprise six symphonies (notably the *Pathétique*), ballets, symphonic poems (*The Storm*, *Francesca da Rimini*, *Manfred*), &c.

Tuba, a name of the lower musical instruments of the saxhorn class. See *Saxhorn*.

Tugela (ty-gā'la), a river of Natal, not navigable, rising in the Drakenberg Mountains, and flowing south-east to the Indian Ocean 50 miles north of Durban; length, 300 miles. Several places on or near it, notably Colenso, came into prominence during the S. African War.

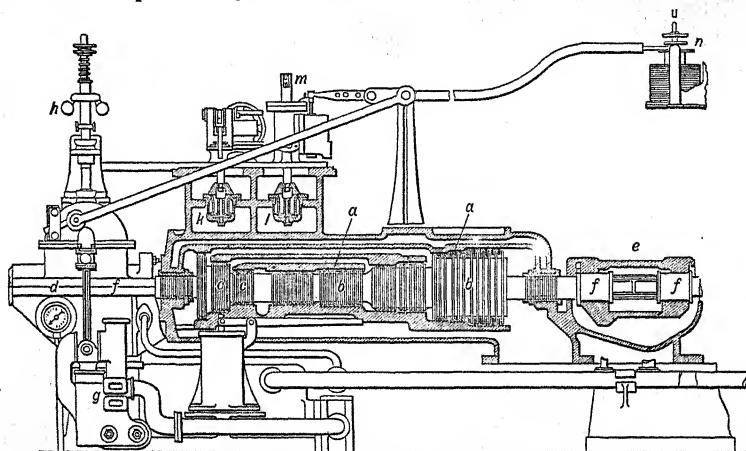
Tull, JETHRO. See *Agriculture*.

Turbines, STEAM. The principle of the ordinary water turbine is briefly explained in the article *Turbine* in the body of the book. That turbines might be driven by steam instead of water was known in very ancient times, and the first steam turbine on record was made by Hero of Alexandria about 200 B.C. It is only very recently, however, that the practical difficulties in applying steam to the turbine were overcome, and the compound parallel-flow steam turbine of the Hon. Charles A. Parsons, F.R.S., was the first to prove of real efficiency (in 1884). In this the expansion of the steam is carried out gradually by a series of steps, thus getting moderate velocities and enabling the power of the steam to be fully utilized. Other types of turbines are also employed—De

TURBINES.

Laval, Curtis, Westinghouse-Parsons, Allis-Chalmers, &c., the Parsons, however, being most common. The chief features consist of a cylindrical case with rings of inwardly-projecting blades, and of a shaft within and concentric to this, bearing many rings of outwardly-projecting blades. The rings of blades on the case nearly touch the shaft, and the rings of blades on the shaft lie between those on the case, which they nearly touch. The fixed blades on the case serve as guides by which the steam is properly directed against the moving blades, and the steam as it passes along from ring to

ring of blades gradually expands and decreases in pressure. The steam turbine has been applied to a variety of uses, such as driving dynamos, driving fans for the ventilation of collieries, centrifugal pumps, air-compressors, &c. One advantage of the steam turbine over the ordinary engine is the absence of all reciprocating parts, and the consequent absence of vibration, whence very small foundations and no holding-down bolts are required; other advantages of the steam turbine are the even-turning movement, and the small space, attendance, and upkeep required.



a a, Cylinder case; *b b*, Revolving shaft; *c c*, Grooved pistons preventing end-thrust; *d*, Oil-keep; *e*, Clutch-coupling; *f f*, Bearings; *g*, Oil-pump; *h*, Governor; *k l*, Valves; *m*, Valve moved by lever *m n*.

The most important field for the steam turbine is the propulsion of ships, where the increasing size and speed of the engines call for a sufficiently powerful motor without reciprocating parts. The first vessel fitted with these engines was the *Turbinia*, launched in 1894, of 44 tons displacement, 100 feet long, 9-feet beam, and 3-feet draught of hull. She was fitted with turbine engines of 2500 horse-power, and reached the unprecedented speed of 34½ knots. Since then, and especially within the last two or three years, the progress of the marine steam turbine has been remarkable. A number of cross-channel steamers have been fitted with these engines, and their lack of vibration has made them especially popular with those who suffer from sea-sickness. On the Clyde the *King Ed-*

ward, 250 feet long and 30-feet beam, was launched in 1901 with engines of 3500 indicated horse-power, the turbines being three in number, each driving a separate shaft. She was followed by the *Queen Alexandra*, the largest passenger vessel constructed for plying on the Clyde. A comparison made between the *King Edward* and the *Duchess of Hamilton*, a non-turbine steamer of the same dimensions, showed that the *King Edward* steamed 18½ knots as against 16½ knots in the case of the *Duchess of Hamilton*, and the coal consumption per mile was about 3 per cent less. The first turbine liners built for passenger service on the Atlantic were the *Victorian* and *Virginian* of the Allan Line. In February, 1905, the Cunard Co.'s turbine-steamer *Carmania* was launched—a vessel of 21,000 tons and

TURFAN — UNITED FREE CHURCH OF SCOTLAND.

21,000 i.h.p., with a speed of 21 knots. The British Admiralty have likewise placed their faith in the turbine. Torpedo-boat destroyers thus fitted have reached 12,000 h.p. and 37 knots speed, as against 6000 h.p. and 31 knots in the case of ordinary engines on the same displacement. The first turbine battleship, the *Dreadnought*, of 18,000 tons and 23,000 h.p., believed to be the most powerful in the navy, was launched in 1906; and further vessels, including armoured cruisers and destroyers, have been ordered by the Admiralty, all to be engined with steam turbines. The steam turbine has also been introduced in yachts, and for these it seems eminently suitable.

Turfan, a town of Eastern (Chinese) Turkestan, on a tributary of the Tarim river, 220 miles N.E. Kashgar. Pop. 10,000.

Turnsole, a name applied to various plants which are regarded as turning with the sun, especially to *Chrozophora tinctoria*, of the order Euphorbiaceæ, a native of the Mediterranean region, Persia, and India. It yields a deep purple dye. *Turnsole blue* is a colour obtained from archil.

Turton, an urban dist. of England, in Lancashire, 4 miles north of Bolton, with

cotton-mills, paper-factories, print-works, bleach-works, &c. Pop. 12,355.

Tuscaloosa, a town of Alabama, U.S.A., on the Black Warrior river, containing the state university and other colleges, the state lunatic asylum, &c. Pop. 5094.

Tusk. See *Torsk*.

Tuskar Rock, a small islet off the coast of Wexford, in Ireland, 7 miles east by north of Carnsore Point, with a lighthouse.

Tusser, THOMAS. See *Agriculture*.

Tutbury, a town of England, Staffordshire, on the Dove, 4 miles north-west of Burton-upon-Trent, with an ancient castle, in which Mary Queen of Scots was imprisoned. Pop. (par.), 1971.

Tweedmouth, a town of England, Northumberland, on the south bank of the Tweed, near its mouth, opposite Berwick-on-Tweed, in which municipal borough it is included. Pop. (par.), 5160.

Tyneside, a parl. division of the county of Northumberland. Pop. 100,887.

Type-setting Machines. See *Printing*.

Tyrant-birds. See *Tyrannus*.

Tyree. See *Tirree*.

Tyrnau. See *Tirnavu*.

Tzar. See *Czar*.

U.

Uckfield, an urban district of England, in Sussex, 14 miles N.E. Brighton. Pop. 2895.

Uitenhage (yut'n-häg), a town of Cape Colony, on the Zwartkops river, 20 miles north by west of Port Elizabeth, with town-hall, court-house, botanical gardens, railway workshops, wool-washing establishments, &c. Pop. 12,193.

Ulundi, a place in Zululand, 170 miles N.E. Pietermaritzburg, the scene of the defeat of the Zulus by a British force under Lord Chelmsford on July 4, 1879.

Uman', a town of Russia, gov. Kiev, on the Umanka, 120 miles south by west of Kiev. Pop. 29,000.

Umbilical Cord. See *Placenta*.

Umta'li, a town of Southern Rhodesia, on the Salisbury-Beira Railway, 120 miles south-east of Salisbury, in a gold-mining region. White pop., 700.

Unconditioned, in philosophy, a word coined by Sir William Hamilton to designate that which has neither conditions, relations, nor limitations either as regards

space or time, and which is therefore incapable of being made an object of thought; the Absolute or the Infinite.

Underground Railways. See *Railways*.

Unga'va, a territory of Canada, comprising most of the Labrador peninsula, and as yet very imperfectly known. It has a very rigorous climate, and few or no resources capable of development. Area, 354,960 sq. miles; pop. 5000. See *Labrador*.

Ungvár, a town of Hungary, on the river Ung, 170 miles E.N.E. Budapest, in a wine-growing district. Pop. 14,723.

Union, a town of the U. States, in New Jersey, on the Hudson river, immediately north of Hoboken and opposite New York. Pop. 15,187.

Union'idæ. See *Mussel*.

Union Jack. See *Union Flag*.

United Free Church of Scotland, a Scottish Presbyterian body formed in 1900 by the union of the United Presbyterian Church with the Free Church of Scotland. A small section of the latter body stood out of the union, and was declared on

appeal to the House of Lords in 1904 to be the true Free Church of Scotland in the eye of the law and entitled to the management of all the property of the Free Church. An executive commission created by Act of Parliament has since allotted most of the property to the United Free Church, while making generous provision for the much smaller body that could by no means make use of the whole. The United Free Church is much the largest and most important of the non-established churches of Scotland. See *Free Church of Scotland* and *United Presbyterian Church*.

United Methodist Free Churches, a denomination constituted by the union of several Methodist bodies. The present name was adopted in 1857. It is one of the larger Methodist churches, and claims to unite the freedom of Congregationalism with the cohesion of Methodism.

Universal Language, an artificial language intended to facilitate international communication, and even to supersede all existing languages. Many attempts have been made to construct such a language, and for a time Volapük (which see) had a considerable vogue. Esperanto (see in *Supp.*), a more recent invention, has met with no small success, but it is highly improbable that any such language will ever come into general and regular use.

Upholland, an urban dist. of England,

in Lancashire, 3 miles west of Wigan, with collieries, quarries, &c. Pop. 4773.

Uppingham, a town of England, in Rutlandshire, 6 miles south of Oakham, with a grammar-school founded in the 16th century, especially famous in last century under Edward Thring. Pop. (par.), 2588.

Uralite, a greenish mineral having the crystalline form of augite, but in properties similar to hornblende. Also a kind of artificial fireproof material manufactured from asbestos.

Urban District, in England and Wales, a local government unit consisting of a more or less populous place of limited area, governed by an elected council, which is responsible for the administration of the Public Health and Highways Acts, &c. In districts with a population of not less than 20,000 the council is the local education authority.

Urmston, an urban district or town of England, in Lancashire, about 4 miles south-west of Manchester. Pop. 6594.

Uskub, a town of European Turkey, on the river Vardar, 120 miles north-west of Salonica, with which and with Servia, &c., it is connected by railway. It has various industries and an active trade. Pop. 40,000.

Utrecht, a town of Natal, 70 miles north-east of Ladysmith, in a coal-bearing district, in territory separated from the Transvaal, and annexed to Natal in 1903. Pop. 3478.

V.

Valency. See *Chemistry*.

Valleyfield, a town of Canada, prov. Quebec, on the St. Lawrence, 30 miles above Montreal. It manufactures cotton, paper, flour, woollens, &c. Pop. 11,055.

Valleys, depressions on the surface of the earth, mostly much longer than broad, and usually traversed by rivers. *Tectonic valleys* are produced by the same movements of folding as give rise to true mountain ranges. They are usually *longitudinal*, that is, they run parallel to the main ridges of the associated mountain system, and they may be of considerable length. *Valleys of erosion* are produced by the erosion of rivers, usually aided by sub-aërial denudation. *Rift-valleys*, such as that of the upper Rhine and the greater ones in East Africa, are the result of subsidence.

Vardö, a town of Norway, in Finmarken,

on an island of the same name at the entrance of the Varanger Fiord, actively engaged in fishing. Pop. 2579.

Varese (vā-rā-zā), a town of Italy, in Lombardy, prov. Como, 12 miles west of Como. Its industries include silk-spinning, silk-weaving, paper-making, &c. Pop. 8000.

Varnish-tree, a name of several trees which yield a secretion suitable for use as a varnish or lacquer. Among them are *Rhus verniciifera*, the Japanese lacquer-tree; *Melanorrhæa usitatissima*, the Burmese black varnish-tree; *Semecarpus anacardium*, the Sylhet varnish-tree; *Elæagia utilis*, the New Granada varnish-tree. The first three belong to the order Anacardiaceæ, the last to the Rubiaceæ.

Vasarhely. See *Maros-Vasarhely*.

Vaudeville, a light kind of comedy, interspersed with songs and dances.

Vaudois. See *Waldenses*.

Vedette, a mounted sentinel stationed at an outpost to give warning of approaching danger.

Vega. See *Garcilaso de la Vega*.

Vegetable Physiology. See *Botany*.

Veiled Prophet. See *Mokanna*.

Veneral Diseases. See *Gonorrhœa*, *Syphilis*.

Venial Sins. See *Sin in Supp.*

Venusberg. See *Tannhäuser*.

Venus's Girdle. See *Girdle of Venus*.

Venus's Looking-glass (*Specularia speculum*), a South European annual plant of the order Campanulacæ, a favourite in flower-gardens. Its purplish flowers unfold in June.

Vercingetorix. See *Alesia*.

Verkhoiansk, a town of Siberia, in prov. Yakutsk, on the river Yana, in lat. 67° 34' N. and long. 133° 51' E., said to be the coldest inhabited place on the earth. The mean annual temperature is barely 2° F., and the lowest recorded temperature is about 90° below zero. Pop. 360.

Vermouth (ver'môt), a cordial consisting of white wine flavoured with wormwood and other ingredients, prepared chiefly in Italy and France.

Vernon, a town of France, in the department of Eure, on the Seine, 35 miles north-west of Paris. Pop. 8757.

Vesuvian. See *Idocrase*.

Vetiver, the East Indian cuscus-grass (*Andropogon squarrosus*), whose fragrant roots are made into mats, baskets, &c. *Vetiver oil* is used in perfumery.

Veto, LOCAL, in practical politics, denotes the closing of public-houses in a local government area, or a subdivision of such area, in accordance with the will of a majority of the electorate, as ascertained by a ballot. Local veto has been tried in the United States, Canada, and New Zealand, with considerable success, except in large towns. It has long been the principal legislative object of the temperance party in Britain, and in 1894 the government introduced a bill giving effect to it and other local options, but the bill was not passed into law. A large majority, two-thirds or three-fourths, is usually required for absolute prohibition in any district, but if the option of reduction is given a bare majority might be sufficient. Many temperance reformers are now in favour of giving the additional option of management by a disinterested com-

pany, with limited profits, or by the local authority.

Viaud (vê-ô), LOUIS MARIE JULIEN, better known by his pen-name, *Pierre Loti*, French novelist, born of Protestant parents at Rochefort in 1850, entered the navy in 1867. He has utilized his naval experiences in a series of stories which have attained great popularity. In 1891 he became a member of the Academy. His chief works are *Le Mariage de Loti* (1880), *Roman d'un Spahi* (1881), *Mon Frère Yves* (1883), *Pêcheurs d'Islande* (1886, his best book), *Roman d'un Enfant* (1890).

Victoria, (1) a town of Mexico, capital of the state of Tamaulipas, 310 miles north of Mexico. Pop. 10,086.—(2) A town of Venezuela, 40 miles south-west of Caracas, with which it is connected by railway. Pop. 12,000.

Vijayanagar. See *Bijayanagar*.

Villeneuve-sur-Lot, a town of France, dep. Lot-et-Garonne, on the Lot, 70 miles south-east of Bordeaux. Pop. 13,594.

Villon, FRANÇOIS, French poet, born at Paris in 1431, date of death unknown. Educated at the University of Paris, he graduated bachelor of arts in 1449 and master in 1452, but fell into a disreputable way of living, and in 1455 had to conceal himself for a time on account of the murder of a priest with whom he had quarrelled about a girl. In 1461 he was saved from execution for theft at Meun by the amnesty proclaimed on the arrival of Louis XI. at the town. About the end of 1462 he was again under sentence of death, this time for being concerned in the wounding of an official of the Paris government, but his sentence was commuted to ten years' banishment. Nothing is known of his later career, but probably he was dead long before 1489, when the first dated edition of his works appeared. His chief writings are the *Lais* or *Petit Testament* and the *Grand Testament*, both being in the form of a poetical will composed on the eve of death. The latter reflects most vividly the whole range of his troubled life, depicting his joys and sorrows, his misdeeds and remorse, with humour, sincerity, real feeling, and poetical power. Several of the admirable ballades incorporated in it were written earlier than the rest of the work.

Vinca. See *Periwinkle*.

Vincennes, a town of the United States,

in Indiana, on the Wabash, 105 miles south-west of Indianapolis. Pop. 10,249.

Vinegar Hill, a low hill in the county of Wexford, Ireland, near Enniscorthy, where the Irish rebels were completely defeated by General Lake on June 21, 1798.

Vinnitza, a town of Russia, gov. of Podolia, on the Bug, 120 miles south-west of Kiev. Pop. 29,000.

Viper's Bugloss (*Echium vulgare*), a plant of the borage order, with spikes of bluish flowers, abundant in some parts of Britain. The markings on the stem suggested the idea that it was useful as an antidote for vipers' bites.

Vire (vér), a town of France, dep. Calvados, on the river Vire, 65 miles S.S.E. Cherbourg, with granite quarries. Pop. 6517.

Virus (Lat. 'poison'), a poison produced in the body of a person suffering from a contagious disease, and capable of producing the same disease in others by means of inoculation.

Vitex. See *Agnus Castus*.

Vitré, a town of France, dep. Ille-et-Vilaine, picturesquely situated on the Vilaine, 20 miles east of Rennes, with old walls, and striking ruins of a mediæval castle, now partly used for museums and a library. Pop. 7336.

Vizeu (vi-ză'u), a town of Portugal, capital of the province of Beira Alta, 160 miles N.N.E. of Lisbon. It is the see of a bishop and has a fine cathedral. Pop. 8216.

Vizianagram, a town of India, in Ma-

dras, 15 miles north by east of Vizagapatam, with a fort. Pop. 37,270.

Volt, the practical unit of electromotive force or electric potential, equal to 100 million times the absolute electromagnetic unit of potential. The international volt is defined for practical purposes as the electromotive force which produces a current of one ampere in a conductor of one ohm resistance, the ampere being defined as the current which would deposit .001118 gram of silver in one second from a solution of silver nitrate, and the ohm as the resistance, at the temperature of melting ice, of a column of mercury, 106.3 cm. long and 1 sq. mm. in cross section, and of mass 14.4521 grams. It is slightly less than the E.M.F. of a Daniell cell.

Voltmeter, in electricity, an instrument for the measurement of electromotive force or potential differences. There are various types of voltmeters. See *Volt* (above).

Vortigern. See *England* (p. 385).

Voters. See *Franchise, Registration, &c.*

Vryburg, a town of Cape Colony, in Bechuanaland, 126 miles by rail north of Kimberley. Pop. 5122.

Vyatka. See *Viatka*.

Vyrnwy (vyrn'wi), a river of Wales, in northern Montgomeryshire, a tributary of the Severn. Lake Vyrnwy, the chief reservoir of the Liverpool water-works, was formed by damming the upper part of the river. It has an area of close on two square miles. The works were completed in 1893.

W.

Wadebridge, a town of England, in Cornwall, on the Camel, here crossed by a bridge originally built in 1485, 6 miles north-west of Bodmin. It exports granite. Pop. 2186.

Wady, an Arabic word denoting a river-course which is filled by an actual river only during seasonal rains.

Wady Halfa, or **HALFA**, a town of the Anglo-Egyptian Sudan, giving name to a province, on the right bank of the Nile, just below the second cataract. Pop. 2675.

Wakefield, a town of the United States, in Massachusetts, 10 miles north of Boston, with various industries. Pop. 9290.

Waldo. See *Waldenses*.

Walker, a former urban district of England, now included in Newcastle.

Walking. See *Athletic Sports*.

Wallace, **SIR DONALD MACKENZIE**, author and traveller, born in 1841, was educated at Edinburgh, Berlin, Heidelberg, and Paris. He was private secretary to the Marquises of Dufferin and Lansdowne during their viceroyalty of India, and from 1891 to 1899 he directed the foreign department of the Times. He attended the Emperor Nicholas II. in 1890-91 when, as Czarewitch, he made a tour through India and Ceylon, and he acted as assistant private secretary to the Prince of Wales during his colonial tour in 1901. His published works include *Russia* (1877; new edition, 1905), *Egypt and the Egyptian Question* (1883), *The Web of Empire* (1902).

Wallace, **SIR RICHARD**, art connoisseur, probably a natural son of the third

Marchioness of Hertford, was born in London in 1818. After amassing and dispersing a splendid collection of art objects, he assisted his half-brother, the fourth Marquis of Hertford, to form a still finer collection. On the marquis's death in 1870 he became heir to this collection and also to Hertford House, in London, a house in Paris, and estates in Ireland. His services during the siege of Paris earned him a baronetcy in 1871, and in 1878 he was created a K.C.B. He sat in parliament as member for Lisburn during 1878-85. He died in Paris in 1890. His widow, daughter of a French officer, at her death in 1897 bequeathed the Wallace collection to the British government, which acquired Hertford House as a home for it. See next art.

Wallace Collection, a collection of pictures, sculptures, arms and armour, furniture, china, &c., belonging to the British government, and now displayed in Hertford House, Manchester Square, London, W. See the preceding article. Hertford House was acquired for £80,000, and the collection was first open to the public in 1900.

Wallasey, an urban district of England, in Cheshire, 2 miles north-west of Birkenhead, with a grammar-school founded in 1595. Pop. 53,579.

Wallawalla, a town of the United States, in the south-eastern part of the state of Washington. It stands in an important wheat-growing district, and has foundries, machine-shops, flour-mills, &c. Pop. 10,049.

Wall-paper. See *Paper-hangings*.

Walmer, a town of England, in Kent, on the coast, 2 miles south of Deal. It is an ancient place, and is a member of the Cinque port of Sandwich. Walmer Castle, the official residence of the Lord Warden of the Cinque Ports, dates from 1539. The Duke of Wellington died in it during his Lord Wardenship. Pop. 5248.

Walsoken, an urban district of England, in Norfolk, 1 mile north-east of Wisbech. Pop. 3250.

Walton le Dale, an urban district of England, in Lancashire, on the Ribble, 2 miles s.e. Preston, in which parliamentary borough it is included. Pop. 11,271.

Walton on Thames, an urban dist. of England, in Surrey, on the Thames, here crossed by an iron bridge, 5 miles w.s.w. Kingston, a popular residential district and tourist resort. Pop. 10,329.

Walvisch Bay. See *Walvisch Bay*.

Wampum, small beads made of shells

formerly used by the American Indians as money, or wrought into belts and other articles for ornamental purposes.

Wanganui (wā-ngā-nō'i), a town of New Zealand, in Wellington provincial district, on the Wanganui, 4 miles from its mouth. It is a flourishing seaport, and has various industries. Pop. 7331.

Wansbeck, a parl. div. of Northumberland, so named from the river Wansbeck, which flows eastwards through Morpeth to the North Sea.

Wanstead, an urban dist. of England, in Essex, near the right bank of the Roding, about 7 miles north-east of St. Paul's. Beside it are Wanstead Park and Wanstead Flats, large public open spaces. Pop. 9179.

Wapenshaw, in Scotland, a review of persons under arms, formerly held at certain times in every district to show that the lieges were properly provided with arms. The name is now applied to gatherings of volunteer corps for review, shooting competitions, and the like.

Warasdin. See *Varasdin*.

Ward, ADOLPHUS WILLIAM, English historian, born in London in 1837, received his education in Germany and at the grammar-school of Bury St. Edmunds, and in 1854 entered Peterhouse, Cambridge, of which he became a fellow. In 1866 he was appointed to the chair of history and English literature in Owens College, Manchester, of which he was principal in 1890-97, and he held important offices in connection with Victoria University. In 1900 he became master of Peterhouse, and in 1901 vice-chancellor of Cambridge University. In 1902 he was appointed an original member of the British Academy. His works include a translation of Curtius's *History of Greece* (5 vols., 1868-73), *History of English Dramatic Literature* (1875; new edn., 1899), *The House of Austria in the Thirty Years' War* (1869), *The Counter-Reformation* (1888), *Great Britain and Hanover* (1899), *The Electress Sophia and the Hanoverian Succession* (1903), monographs on Chaucer and Dickens in the *English Men of Letters Series*, &c. He is one of the editors of the *Cambridge Modern History* (first vol., 1902), planned by Lord Acton.

Warden, the title of various officials, notably Wardens of the Marches, formerly appointed to keep order in troublesome frontier districts; the Lord Warden of the Cinque Ports, who has the dignity of an admiral;

the heads of several Oxford colleges; the heads of some university settlements, &c.

Warren, SAMUEL, English novelist, born in 1807. He studied medicine at Edinburgh, was called to the English bar in 1837, and obtained the recordership of Hull in 1852. He sat in the House of Commons as a Conservative during 1856-59, retiring on his appointment as a master in lunacy. He died in 1877. Warren is remembered chiefly by his very popular novel, *Ten Thousand a Year*. His *Passages from the Diary of a Late Physician* was also popular.

Waste Lands. See *Inclosure Acts*.

Waste Products, UTILIZATION OF. Recent industrial history furnishes several notable examples of the successful and profitable utilization of apparently useless waste substances or by-products as the raw materials of flourishing manufacturing industries. The spinning of waste silk, the manufacture of dyes from coal-tar, and the utilization of the gaseous products of the blast-furnace in heating are instances.

Water-brash. See *Pyrosis*.

Water-caltrops. See *Trapa*.

Water-closets. See *Sevage*.

Water-dropwort. See *Dropwort*.

Water-hemlock. See *Hemlock*.

Water-horehound, same as *Gypsywort* (which see).

Water in the Head, same as *hydrocephalus*. See *Dropsy*.

Waterloo, a town of the United States, in Iowa, on the Cedar river, 90 miles north-east of Des Moines. Pop. 12,580.

Waterloo with Seaforth, an urban dist. of England, in Lancashire, a northern suburb of Liverpool, immediately north of Bootle, a favourite residential district, with good sea-bathing. Pop. 23,102.

Water-soldier (*Stratiotes aloides*), a plant of the order Hydrocharidaceae, growing in still waters in eastern England. It has strap-shaped radical leaves, and white flowers in spadices.

Water-tight Compartments. See *Ship*.

Waterville, a town of the U. States, in Maine, on the Kennebec, 70 miles N.N.E. Portland, with a Baptist university. Pop. 9477.

Watervliet. See *Shakers, West Troy*.

Watling Island, one of the Bahama Islands, to the east of the centre of the group, perhaps the San Salvador of Columbus. See *Bahama Islands*.

Watson, JOHN, author, better known by his pseudonym of *Ian Maclaren*, born at

Manningtree, Essex, in 1850, was educated at Stirling Grammar School, Edinburgh University, New College, Edinburgh, and the University of Tübingen. He became a licensed minister of the Free Church of Scotland in 1874, and after short periods of ministerial service at Logiealmond and Glasgow he was chosen in 1880 minister of Sefton Park Presbyterian Church, Liverpool. He resigned this charge in 1905. He has published under the pseudonym of *Ian Maclaren* successful stories and sketches of Scottish life, especially *Beside the Bonnie Brier Bush* (1894); and under his own name there have appeared a number of religious and theological works, among them *The Upper Room* (1895), *The Mind of the Master* (1896), *The Life of the Master* (1901), and *The Homely Virtues* (1903). He received the degree of D.D. from St. Andrews and Yale universities. He died in 1907.

Watson, WILLIAM, English poet, was born in 1858. His first volume, *The Prince's Quest and other Poems*, was published in 1880. Four years later he issued his *Epigrams of Art, Life, and Nature*, but it was not till the publication of *Wordsworth's Grave and other Poems* (1890) that he gained adequate recognition from the public. His later volumes include *Lachrymæ Musarum and other Poems* (1892), the title-poem being a fine elegy on Tennyson; *The Eloping Angels* (1893); *Odes and other Poems* (1894); *The Father of the Forest and other Poems* (1895); *The Hope of the World and other Poems* (1898); *Ode on the Coronation of King Edward VII.* (1902); and *For England* (1903), a collection of poems in opposition to the South African War. He has also published *Excursions in Criticism* (1893) in prose. He received the degree of LL.D. from Aberdeen University in 1904. Mr. Watson's poetry, with great beauty of expression, depth of thought, and high finish, is somewhat lacking in spontaneity.

Watt, the practical electric unit of power, equal to ten million times the absolute electromagnetic unit of power. It is the power represented by a current of one ampere flowing through a conductor whose ends differ in potential by one volt. A *kilowatt* is equal to 1000 watts. A horsepower is equal to 746 watts approximately, and therefore a kilowatt equals about 1.34 h.p. The *kilowatt-hour*, or *Board of Trade unit*, is the practical unit of electric energy.

Wattle. See *Acacia*.

Wattmeter, an instrument for measuring electrical power. The wattmeter, which is required chiefly on alternating circuits, is essentially a combination of a voltmeter and an ammeter, and is almost always an electrodynamic instrument.

Watts-Dunton, THEODORE, English poet, critic, and novelist, born in 1836. He was educated privately and for a time studied law, but soon found his true vocation in literature. His long connection with the *Athenæum* began in 1875. In 1897 he collected in *The Coming of Love* and other Poems some of the more important of his poetical contributions to the *Athenæum* and other periodicals. *Aylwin*, a novel or romance published in 1898, forms a striking prose counterpart to *The Coming of Love*, and shows intimate knowledge of Gypsy life. Among his other works are *The Christmas Dream: A Dramatic Idyll* (1901), *The Renaissance of Wonder* (1903), *Studies of Shakespeare* (1903), and *Carniola* (1906), the last a novel. Till 1896 he was known simply as Theodore Watts, but in that year he added his mother's name, Dunton.

Waukegan, a town of Illinois, U.S.A., on Lake Michigan, 30 miles north of Chicago. Pop. 9,426.

Wausan, a town of the U. States, in Wisconsin, on the Wisconsin river, with timber industries, &c. Pop. 12,354.

Way, RIGHT OF. See *Right of Way*.

Wazan, a sacred city of Morocco, 55 miles north-west of Fez, head-quarters of the Grand Shereef. Pop. 20,000.

Wazirabad, a town of India, in the Punjab, near the Chenab, here crossed by the Alexandra railway bridge. Pop. 18,069.

Waziris, a hardy Afghan race occupying Waziristan, a mountainous tract of country on the north-west frontier of India. They have given trouble to the British on several occasions.

Wear, a river of England, rising on the border of Cumberland and flowing eastwards through Durham, past Bishop Auckland and Durham to the North Sea at Sunderland; length, 65 miles. It is navigable by barges to Durham.

Weathering, the wearing down of rock surfaces exposed to the atmosphere by rain, frost, wind, the alternation of heat and cold, chemicals in the air and the rain, &c. See *Geology*.

Webb, SIR ASTON, architect, born in London in 1849, became an A.R.A. in 1899, and an R.A. in 1903. Among the

notable buildings which he has designed in whole or in part are the Victoria and Albert Museum and the Royal College of Science, the architectural surroundings for the Victoria Memorial, the Britannia Royal Naval College at Dartmouth, the Royal College of Science in Dublin, Birmingham University, the new Christ's Hospital at Horsham, &c. He was knighted in 1904.

Weismann (vis'man), AUGUST, German biologist, born in 1834, studied medicine at Göttingen. He was appointed extraordinary professor at Freiburg in 1866, and ordinary professor in 1873. His first book of note was *Studies in the Theory of Descent* (1875-76). The most important of his subsequent works are: *Essays upon Heredity and Kindred Biological Problems* (1889-92), *Germ Plasm* (1893), *The Omnipotence of Natural Selection* (1893), *Fresh Thoughts on the Question of Heredity* (1895), *On Germinal Selection* (1896), *Lectures on the Theory of Descent* (1902), and *The Evolution Theory* (1904). Weismann is a strong supporter of the natural selection theory, but he is specially known by his theories on the question of heredity. He explains heredity by the continuity from generation to generation of the so-called germ-plasm, and on this basis denies the possibility of inheriting acquired characters.

Wellhausen (vel'hau-zn), JULIUS, German Orientalist and Old Testament scholar, born at Hameln in 1844. He was educated at Göttingen University, and became in 1872 professor of theology in the University of Greifswald, in 1882 went to Halle as extraordinary professor of Oriental languages, in 1885 was appointed professor at Marburg, whence he removed in 1892 to Göttingen. He is one of the most distinguished of the 'higher critics' of the Pentateuch, and has contributed essentially to the now widely accepted modern views regarding its date and authorship. His principal works are: *Prolegomena to the History of Israel* (1878), *The Composition of the Hexateuch and the Historical Books of the Old Testament* (1885), *Israelitish and Jewish History* (1894), *Remains of Arabian Heathenism* (1897), *The Arabian Empire and its Fall* (1902), and *The First Three Evangelists* (1903-04).

Welsbach Light. See *Gas (Lighting by)*.

Wen-chow, a treaty-port of China, in the province of Che-kiang. Pop. 80,000.

Wendover, a town of England, in Buckinghamshire, 5 miles south-east of Ayles-

WEST AFRICA — WHITEFISH.

bury, separately represented in the House of Commons till 1832. Pop. (par.), 2009.

West Africa, BRITISH. See *Gambia, Sierra Leone, Gold Coast, Lagos, Nigeria*. FRENCH. See *French West Africa in Supp.* GERMAN. See *Camerouns, Togoland*. PORTUGUESE. See *Angola and Portuguese Guinea*.

West Calder, a town of Scotland, in Edinburghshire, 15 miles south-west of Edinburgh, in a district producing coal, shale, and iron. Pop. 2652.

Westcott, BROOKE FOSS, Bishop of Durham, born in Birmingham in 1825, graduated at Trinity College, Cambridge, in 1848, and was ordained in 1851. He was assistant-master at Harrow (1852-69), residentiary canon of Peterborough (1869-83), regius professor of divinity at Cambridge (1870-90), Canon of Westminster (1883-90), and in 1890 he succeeded Lightfoot in the see of Durham, proving an admirable bishop. He died in 1901. The revision of the Greek text of the New Testament occupied him and Dr. Hort for twenty-eight years, and resulted in the publication of their important work, *The New Testament in the Original Greek*, in 1881. This text formed the basis of the Revised Version of the New Testament. Dr. Westcott's other works include *History of the Canon of the New Testament* (1855), *Introduction to the Study of the Gospels* (1860), *History of the English Bible* (1863), *Essays in the History of Religious Thought in the West* (1891), *The Gospel of Life* (1892), &c.

Westfield, a town of the United States, in Massachusetts, on the Westfield river, 8 miles west of Springfield. Pop. 12,310.

Westgate on Sea, a watering-place of England, in Kent, 2 miles west of Margate. Pop. (parish), 2738.

Westinghouse Brake. See *Railways*.

West Prussia. See *Prussia*.

Weyman, STANLEY JOHN, English novelist, born in 1855, was educated at Shrewsbury School and Christ Church, Oxford, where he graduated in 1877. He was called to the bar in 1881 and practised for a time. In 1890 he began his literary career by a historical romance entitled *The House of the Wolf*. His reputation was first secured by his brilliant story of the French Huguenots, *A Gentleman of France* (1893). His later novels, mainly historical, include *Under the Red Robe* (1894), *My Lady Rotha* (1894), *The Red Cockade* (1895), *The Man in Black* (1896), *Shrewsbury* (1897), *Count Hannibal* (1901), *The*

Abbess of Vlaze (1904), *Starvecrow Farm* (1905), and *Chippinge* (1906), the last treating of the first Reform Bill agitation in England.

Whetstones. See *Hone*.

Whidah. See *Whydah*.

Whinstone, a provincial or popular name applied to any kind of hard, compact, unstratified rock, such as basalt or greenstone.

Whippet, a kind of small greyhound, with something of a terrier strain, greatly favoured for racing and rabbit-coursing by miners in the north of England and also in Scotland.

Whip-snake, a name applied to various species of exceedingly slender snakes, some of them venomous.

Whistler, JAMES ABBOTT McNEILL, painter and etcher, born at Lowell, Massachusetts, in 1834, received his art training in Paris under Gleyre. In 1863 he took up his residence in London, and latterly he resided in Paris. He died in 1903. Whistler was an artist of splendid powers, but his work was marred, especially in the later part of his career, by his attempt to eliminate from his subjects all spiritual and imaginative elements. He was especially noted for his 'nocturnes' or night-pieces. A severe attack by Ruskin upon one of his pictures led to a libel action, in which the painter got a nominal verdict. His chief paintings are: *The White Girl* (1862); *Portrait of My Mother* (1872), now in the Luxembourg Gallery, Paris; *Portrait of Carlyle* (1872), purchased by Glasgow Corporation in 1891; *Lady Archibald Campbell* (1888); *Miss Alexander* (1888); and a *Portrait of Sarasate*. As an etcher he occupies a very high position. Rather amusing publications of his are *The Gentle Art of Making Enemies* (1890) and *The Baronet and the Butterfly* (1899).

Whitchurch, an urban district and market-town of England, in Shropshire, 10 miles s.w. Nantwich; carries on brewing, malting, cheese-making, &c. Pop. 5221.

Whitechapel, a parish in London, in the borough of Stepney, giving name to a division of the parliamentary borough of Tower Hamlets. Pop. of parish, 33,634; of parl. division, 78,634.

Whitefield, an urban district of England, in Lancashire, 5 miles north by west of Manchester, with fine villa residences and manufactures of cottons, &c. Pop. 6588.

Whitefish, a name applied to various species of fish, especially *Coregonus clupei-*

formis of the North American lakes and other species of the same genus, and also species of the genus *Leuciscus* (which see).

White-Leg, another name for *milk-leg* or *phlegmasia dolens*. See *Phlegmasia*.

Whites, a popular name of *leucorrhœa* (which see).

Whithorn, a royal and municipal burgh of Scotland, in Wigtownshire, 9 miles south of Wigtown. The first Christian church in Scotland was founded here near the end of the fourth century by St. Ninian. Pop. 1188.

Whitley, an urban district of England, on the coast of Northumberland, 2 miles north of Tynemouth, a popular bathing resort. Pop. 7705.

Whitney, Mr. See *Sierra Nevada* (U.S.A.).

Whittington, an urban district of England, in Derbyshire, 2 miles north of Chesterfield, with collieries and iron and steel works. Pop. 9416.

Whitwood, an urban district of England, in Yorkshire (West Riding), on the Calder, 9 miles S.E. Leeds, with collieries. Pop. 4873.

Wympster, EDWARD, traveller and artist, son of a wood-engraver and water-colour painter, was born in London in 1840. He was trained in his father's profession, and early directed his energy to travel, especially in mountainous regions. On July 14, 1865, he was one of the first party to reach the summit of the Matterhorn or Mount Cervin (which see), when several lives were lost. In 1879-80 he visited Ecuador and ascended Chimborazo, Cotopaxi, Antisana, &c., all but Cotopaxi for the first time. In 1901-05 he mountaineered in Canada. He has been awarded the Patron's Medal of the Royal Geographical Society. His published works include: *Scrambles amongst the Alps* (1871), *Travels amongst the Great Andes of the Equator* (1892), *Chamonix and Mont Blanc* (1896), and *Zermatt and the Matterhorn* (1897).

Wigston Magna, an urban district of England, in Leicestershire, 4 miles south of Leicester, with large engine sheds of the Midland Railway Company. Pop. 8404.

Wilde, OSCAR O'FLAHERTIE WILLS, author, son of the surgeon, Sir William Wilde, was born in Dublin in 1856. He was educated at Trinity College, Dublin, and Magdalen College, Oxford, graduating B.A. in 1878, with a first in classics, and winning the Newdigate prize. At college he gained a great reputation as the founder of a cult of æstheticism, ridiculed by W. S.

Gilbert in the well-known comic opera, *Patience* (1881). A volume of fairy tales published in 1888 was followed by other works, notably the novel *Dorian Gray* (1891); and several plays from his pen met with success, among them *Lady Windermere's Fan* (1892), *A Woman of No Importance* (1893), *Salomé* (acted in Paris, but forbidden by the British censor) (1893), *The Ideal Husband* (1895), and *The Importance of being Earnest* (1895). In 1895 he was sentenced to two years' imprisonment, with hard labour, for an infamous crime, was released in 1897, and died in Paris in 1900. The *Ballad of Reading Gaol* was published in 1898, and *De Profundis*, a sort of *apologia*, appeared posthumously in 1905.

Wilbebeeste. See *Gnu*.

Wildfowl, a general name for wild birds shot as game, especially water-fowl.

Willington, an urban district of England, in the county of Durham, on the left bank of the Wear, 6 miles south-west of Durham, with large collieries. Pop. 7887.

Willington Quay, an urban district of England, in Northumberland, on the Tyne, opposite Jarrow. It was closely associated with the two Stephensons, and has engineering, shipbuilding, iron-works, chemical and fire-clay works, &c. Pop. 7941.

Wilmslow, an urban district of England, in Cheshire, on the river Bollin, largely residential. Pop. 7361.

Winchelsea, an old borough of England, in Sussex, near the coast, 2 miles south-west of Rye, one of the Cinque Ports. It was formerly a place of importance, and was represented by two members in the House of Commons till 1832. Pop. 674.

Windau, a seaport of Russia, in Courland, 100 miles north-west of Riga. It has a deep harbour, almost completely ice-free. Pop. 7132.

Windflower. See *Anemone*.

Winsford, an urban district of England, in Cheshire, 5 miles south of Northwich, a great seat of the salt industry. Pop. 10,382.

Winston, a town of the U. States, in N. Carolina, 95 miles W.N.W. Raleigh, with tobacco and cotton manufactures. Pop. 10,008.

Wint, PETER DE. See *De Wint*.

Wirksworth, an urban district and market-town of England, in Derbyshire, 12 miles north by west of Derby. Pop. 3807.

Wirral, a peninsula of Cheshire, between

the estuaries of the Mersey and Dee, a parl. div. of the county. Pop. 100,845.

Witham, an urban district of England, in Essex, on the Blackwater, 8 miles north-east of Chelmsford. Pop. 3454.

Withington, an urban district of England, in Lancashire, 3 miles south of the centre of Manchester, of which it is a residential suburb. Pop. 36,202.

Witte (vit'té), COUNT SERGE JULIEVITCH, Russian statesman, was born in 1849 at Tiflis, studied at Odessa University, and in 1877 entered the State Railway service. Latterly he was director of the Railway Department at the Ministry of Finance. In 1892 he was appointed minister of ways and communications, and in the following year he became minister of finance. Under him home industries were fostered by means of a moderate protective tariff, the Siberian Railway built, and the sale of alcohol was made a state monopoly. In 1896 he was appointed secretary of state to the czar; and in 1899 privy councillor. In 1903 he became president of the Committee of Ministers. In August 1905 he was Russian plenipotentiary in America in the peace negotiations with Japan, and was largely instrumental in securing for Russia the favourable terms granted, being rewarded with the rank of count. Throughout the internal disorders beginning in 1905 he was at the head of affairs, but could do little to stop the outbreaks. On October 30, 1905, the czar signed a constitution, by which a responsible ministry was created, with Count Witte as prime minister, but he resigned next year. He has published books on *The Principles of Railway Tariffs* (1883), and *Friedrich Liss, Economist* (1888).

Witwatersrand. See *Johannesburg, Transvaal, Gold*.

Wivenhoe, an urban district of England, in Essex, at the head of the Colne estuary, 3½ miles s.e. Colchester, with a fine old church, oyster-fishing, &c. Pop. 2560.

Woburn, a town of England, in Bedfordshire, 12 miles south-west of Bedford. Near it is Woburn Abbey, the seat of the Duke of Bedford. Pop. (par.), 1129.

Wolf-hound, the name of two varieties of dog similar to the deerhound. The Irish wolf-hound is more massive than the deerhound, and stands about 31 inches high at the shoulders. The Russian wolf-hound, also known by the name of borzoi, is a rather smaller animal. In Russia it has

long been bred for wolf-hunting, and is now familiar at British dog shows.

Wolf Rock, a small island, 8 miles s.w. Land's End, with a lighthouse.

Wolgast, a town of Prussia, in Pomerania, on the Peene, opposite the island of Usedom, an old town which played a part in the Thirty Years' War. Pop. 8251.

Wollongong, a town of New South Wales, on the coast, 49 miles s.s.w. Sydney. It has a harbour excavated out of the solid rock. Pop. 3545.

Wollstonecraft. See *Godwin (Mary)*.

Wolverine, **WOLVERENE**. See *Glutton*.

Wood, SIR EVELYN, British general, born at Cressing, Essex, in 1838, was the youngest son of the Rev. Sir John Page Wood, Bart. Educated at Marlborough College, he entered the navy in 1852, and served with distinction in the Crimean War. In 1855 he joined the army as cornet in the 13th Dragoons, and in the mutiny campaign in India in 1858 he served with the 17th Lancers. He was twice mentioned in despatches, and was awarded the Victoria Cross for conspicuous valour. After going through the Ashantee War he was called to the Bar at the Middle Temple in 1874. For his brilliant conduct in the Zulu War of 1879 he was promoted brigadier-general and created K.C.B. He was second in command of the British forces in the short Transvaal War of 1881, and in 1884-85 he commanded the line of communication in the Nile expedition. He was quartermaster-general to the forces in 1893-97, adjutant-general in 1897-1901, and commander of the second army corps district in 1901-05. He was made G.C.M.G. in 1882, G.C.B. in 1891, and field-marshal in 1903. His publications include *The Crimea* in 1854-94; *Cavalry at Waterloo*; and *From Midshipman to Field Marshal* (1906), the last an excellent autobiography.

Woodburytype. See *Photography*.

Wood-carving. See *Carving*.

Woodchat. See *Shrike*.

Woodford, an urban dist. of England, in Essex, 8 miles n.e. St. Paul's. Pop. 13,798.

Wood Green, an urban dist. of England, in Middlesex, 6 miles north of St. Paul's. Pop. 34,233.

Wood-ibis. See *Tantalus*.

Wood-preserving. See *Timber*.

Woolsorter's Disease. See *Anthrax*.

Workmen's Compensation. For the Employers' Liability Act of 1880 and the Workmen's Compensation Act of 1897,

with the amending Act of 1900, see *Employers' Liability*. An Act passed in 1906 greatly extended the range of compensation. It applies to all workmen not expressly excluded, among the classes included for the first time being seamen and domestic servants; and it affirms the liability of employers for incapacity or death due to certain specified industrial diseases.

Worsborough, an urban dist. of England, in Yorkshire (W. Riding), 10 miles north of Sheffield, with collieries, steel-works, gunpowder-mills, &c. Pop. 10,336.

Worsley, an urban dist. of England, in Lancashire, 5 miles w. by n. Manchester, on the Bridgewater Canal, with collieries and cotton-factories. Pop. 12,462.

Woundwort. See *Stachys*.

Wrath, CAPE. See *Cape Wrath*.

Wrestling. The following are the principal recognized styles of wrestling: (1) *Cumberland and Westmorland*, in which the wrestlers clasp hands round each other's body, with the left arm uppermost, the loser being the one who breaks his hold or touches the ground with any part of his person other than his feet; (2) *Lancashire*

or *Catch-as-catch-can*, a form of ground-wrestling in which any hold is permitted, two shoulders down constituting a fall; (3) *Cornwall and Devon* or *Catch-hold*, in which the antagonists are permitted to catch hold anywhere above the waist or by any part of the jacket, two shoulders and one hip, or two hips and one shoulder down constituting a fall; (4) *Greco-Roman* (so-called), similar to the Lancashire, except that a catch below the waist and tripping are disallowed; (5) *Scotch*, a hybrid of the Cumberland and Westmorland and the Greco-Roman style. Elaborate wrestling styles have been developed in India and Japan, depending much upon skill and agility. See *Jiu-jitsu* in *Supp.*

Wrist. See *Hand*.

Writing-machines. See *Type-writer*.

Wuchang. See *Woo-chang*.

Wynberg (win'berg), a town of Cape Colony, on the eastern side of Table Mountain, 8 miles south-east of Cape Town, of which it forms a suburb. It stands in a wine-producing district. Pop. 18,468.

Wynkyn de Worde. See *Printing*.

X.

Xyloidine, an explosive formed by the action of nitric acid on starch.

Xylonite, another name of celluloid (which see).

Y.

Yalta, a watering-place of Russia, on the south-east coast of the Crimea, at the base of the Yaila Mountains. Near it is Livadia, an imperial residence. Pop. 19,572.

Yalu, a river separating Korea from Manchuria and flowing into Korea Bay. For the two Japanese victories here, in 1894 and 1904, see *Japan (History)*. The port of Wiju is on the Korean side, a little above the mouth of the river.

Yana'on, a French possession in India, on the left bank of the Godavari, near its mouth. Area, 5½ sq. miles; pop. 4708.

Yarmouth, a small seaport of England, in the Isle of Wight, at the mouth of the Yar, where it enters the Solent. Down till 1832 it sent two members to the House of Commons. Pop. (par.), 948.

Yassy. See *Jassy*.

Yeoman, a name formerly applied to certain servants in royal and noble households, later to small freeholders, and latterly in a loose way to farmers and others of similar status. The *Yeomen of the Guard* are a royal bodyguard dating from 1485 and still wearing the picturesque uniform of that period. The officers comprise a captain, usually a peer, a lieutenant, an ensign, a clerk of cheque and adjutant, and four exons. The men are old soldiers, and are armed with partisans and short swords. The warders of the Tower wear almost the same uniform. See *Beefeaters*.

Yiddish, a corrupt German-Hebrew hybrid dialect, with words from other sources, spoken by Jews, and also used in their newspapers and books. The word

Yiddish is a corruption of *Jüdisch*, the German word for *Jewish*.

Yilgarn, a goldfield of Western Australia, 230 miles east of Perth. The chief centre of population is Southern Cross, on the railway from Perth.

Ymuiden. See *Amsterdam*.

Yola, a town of Northern Nigeria, on the left bank of the Benue, 400 miles E.N.E. Lokoja. It was formerly the capital of the native kingdom of Adamawa. Pop. 15,000.

Yoni. See *Lingam*.

Yorkshire College. See *Leeds*.

Yukon, a territory in the north-west of

Canada, between British Columbia, Alaska, the Arctic Ocean, and the Rocky Mountains, intersected by the upper course of the navigable Yukon, which is reached by railway from the port of Skagway in Alaska. The territory is of importance for its yield of gold on the Klondike and elsewhere, the total obtained since 1897 being some twenty millions sterling. The climate is pleasant in summer, very severe in winter. Dawson, at the junction of the Klondike with the Yukon, is the capital. The area is about 197,000 sq. miles; the pop. is 28,000.

Yuryev. See *Dorpat*.

Z.

Zambesia, a name formerly applied to the territory now known as Rhodesia (which see); still used as the name of the central division in Portuguese East Africa.

Zangwill, ISRAEL, Jewish novelist and playwright, born in London in 1864. A graduate of London University, he was a teacher for a time, and has gained considerable success as journalist, novelist, playwright, and lecturer. His stories, several of which treat of Jewish life, include *Children of the Ghetto* (1892), *Ghetto Tragedies* (1893), *The King of Schnorrers* (1894), *Dreamers of the Ghetto* (1898), *They that Walk in Darkness* (1899), *The Mantle of Elijah* (1900), and *Ghetto Comedies* (1907). Mr. Zangwill is a leading supporter of the Zionist movement. His brother Louis is also a writer.

Zeebrugge (zā'brug-gē). See *Bruges*.

Zeehan, a town of Tasmania, 225 miles north-west of Hobart, centre of a silver-lead mining district. Pop. 5014.

Zell. See *Celle*.

Zenta, a town of Hungary, on the Theiss, 25 miles south of Szegedin. Prince Eugene of Savoy defeated the Turks here on September 11, 1697. Pop. 28,600.

Zermatt, a village of Switzerland, in the canton of Valais, near Monte Rosa, the Matterhorn, and other lofty peaks, a favourite tourist resort. Pop. 900.

Zeyst. See *Zeijst*.

Zidon. See *Sidon*.

Zierikzee (zē'rik-zā), a town of Holland, on the island of Schouwen, formerly an important seaport. Pop. 6818.

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Zimbab'we, or ZIMBAB'WE, a notable group of ruins in Southern Rhodesia, 17 miles south of Victoria. There are two principal structures: a kind of citadel on the crest of a granite hill, and an elliptical enclosure with granite walls on the lower level ground. The latter is divided into chambers, most of which are roofed, and contains two conical solid towers. The ruins are not generally supposed to be very ancient, but their origin is quite unknown. Smaller ruins of similar nature are found elsewhere in Southern Rhodesia and the Transvaal.

Zionism, a movement for the re-establishment of the Jewish nation in Palestine. It was founded by Dr. Theodor Herzl, of Vienna, and Zionist congresses have been held annually since 1897. In 1903 the British government offered land in British East Africa for the settlement of a self-governing Jewish colony under British sovereignty, but at the 1905 congress the offer was rejected. In consequence of this decision Mr. Israel Zangwill and others formed the Jewish Territorial Organization, which seeks to settle an autonomous Jewish community on any suitable land that can be obtained, whether in Palestine or not.

Zomba, capital of Nyasaland (British Central Africa) Protectorate, on the northern slope of Mt. Zomba, 10 miles west of Lake Shirwa, 3000 feet above the sea. The population is still small.

Zwittau (tsvit'ou), a town of Austria in Moravia, on the Zwittawa, 40 miles north of Brünn, with cotton, linen, tobacco, and other industries. Pop. 9000.

